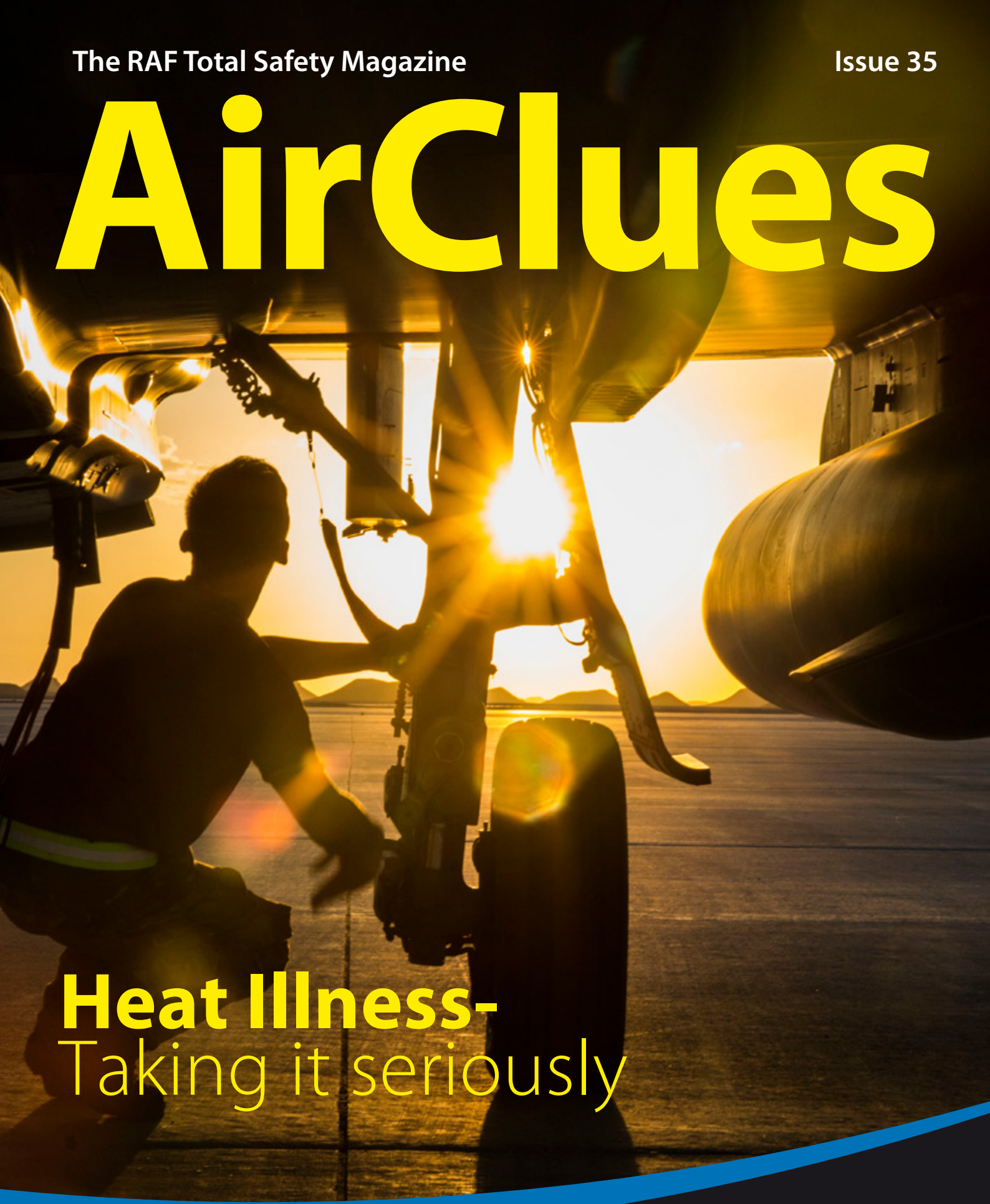
The RAF Total Safety Magazine

Issue 35

AirClues



Heat Illness-
Taking it seriously

ROYAL AIR FORCE
Safety Centre

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Foreword

By Inspector of Safety (RAF)

Air Commodore Sam Sansome

I'm sitting looking out of my window at the rain pelting down as I type the first of many introductions to Air Clues. Considering the weather, it seems a little strange to be thinking about Climatic Injury, but I am buoyed by an article in the paper last week – 'June to bring 16-day heatwave after coldest May in 25 years. On the balance of all evidence we are going to have to get used to more weather extremes and a general increase in global temperatures – perhaps a subject for another day – but what does that mean from a safety perspective? One aspect to consider, certainly, is climatic injury and how we manage our risk of exposure to it.

Defence has not always managed the risks of heat illness and cold injury as well as it should, and following a number of tragic cases, coroners' reports have compelled us to rethink how we manage the risks. Hopefully you'll all be at least aware of the new climatic injury policy contained in JSP375 Chapters 41 and 42 (Heat Illness Prevention and Cold Injury Prevention respectively) – and even if you haven't read them in detail you may at least be wondering 'does this affect me'? The answer is simple – yes.

There is a reason why we in the UK obsess about the weather and the majority of us don't step a foot outside the door until they have carried out a risk assessment to determine what you should be wearing – rain coat or sun block – it is common sense. Similarly, our collective responsibility to protect people from climatic injury is utterly obvious; what is outlined in the new JSP375 chapters is **what we have to do** to ensure there are no avoidable deaths or occurrences of heat illness or cold injury. It isn't as simple as just looking at the weather though – or even the actual or predicted Wet Bulb Globe Temperature – as heat illness in particular is dependent on more than just the temperature and humidity; it is what you are doing and how strenuous it is - and what effect the combination of heat, humidity and exercise is going to have on your core body temperature.

It's also really important to realise that this isn't just about endurance marches or training runs – it is about whatever we are tasking our people to do, from working on hot aircraft dispersals to standing on guard. I would encourage everyone to read and understand their responsibilities as outlined in the new policy. Most of all, in what I hope will be a glorious British summer, I would ask you to make sure you know what the symptoms of heat illness are so that you can recognise them in yourself and in others and also to know how to treat heat illness – early recognition and treatment can save lives. A good place to start is in the Individuals Guide to Heat Illness – Annex B to Chapter 41 of JSP375 and also the article on page 16. Have a safe summer. ■

Safety Awards

Flt Lt Simon Bowes - Rudder Failure - Green Endorsement

On 28 Jan 2021, Flight Lieutenant Bowes was the QFI delivering an instructional sortie to an Oxford University Air Squadron student pilot in a Tutor aircraft out of RAF Benson. When flying a slow roll, the student felt an unusual and un-demanded rudder input. The aircraft had suffered a catastrophic failure of the lower rudder mounting point. Flight Lieutenant Bowes took control and, avoiding any rudder inputs, he positioned the aircraft towards the nearest runway, whilst gaining height, and reminded the student of the abandonment procedure in anticipation of loss of control. Declaring a PAN to ATC, and once over the disused airfield at Abingdon, he carried out a low-speed handling check and diagnosed the rudder problem. Smoothly applying progressive left rudder pressure, the control response appeared reduced. Smooth rudder inputs were not possible, and the controls felt as if they were slipping, but a mechanical interference was also apparent.

Unaware of the extent of any damage, but assessing he had enough control to maintain safe flight, Flight Lieutenant Bowes realised that a return to the nearest suitable airfield with emergency services would entail a landing with a strong crosswind, risking a loss of control during the approach and landing. He therefore opted for a longer transit to RAF Brize Norton, where the strong wind was aligned with the runway. As he established on his approach, Flight Lieutenant Bowes felt that his rudder inputs to keep the aircraft in balance made no effect and he felt the rudder 'fluttering' through the airframe as though it was flapping in the airflow. The student was unaware of this, but Flight Lieutenant Bowes kept his student calm and relaxed as he continued down the approach and landed the stricken aircraft. ■

Fg Off Jim Perkins - First Solo - Good Show

On 23rd November 2020, Flying Officer Perkins was an ab-initio student pilot conducting Elementary Flying Training with University of London Air Squadron at RAF Wittering. On this day, he had successfully completed a dual to solo sortie and, with the Qualified Flying Instructor supervising from the tower, he was authorised to carry out his successful first solo take-off in a Grob Tutor.

Whilst actioning the after take-off checks he noticed a loud, continuous, whining noise as the flaps were travelling to the 'UP' position. Despite this distraction, he completed the after-take-off checks and continued to fly the aircraft, joining the visual circuit at RAF Wittering. Once established in the visual circuit he correctly identified a flap actuator fault, a relatively unusual technical problem on the Grob Tutor, and actioned the most suitable FRC Emergency drill. Following his fault diagnosis, he correctly assessed that a flapless circuit to land would be required. This was a procedure that he had only recently been shown by his Qualified Flying Instructor. Despite this, and his limited flying experience, he conducted a textbook flapless approach and landed the aircraft safely off his first approach. ■

SAC(T) Christopher Cameron - FOD Spot - Well Done

On 05 Feb 21 at RAF Akrotiri, SAC(T) Cameron was carrying out a FOD sweep of an aircraft dispersal as part of his daily duties.

He noticed what appeared to be a small protrusion sticking up from the aircraft movement surface directly behind an aircraft shelter, which formed part of the main route for taxiing aircraft. SAC(T) Cameron assessed that the protrusion was the result of a failed repair patch of 4 concrete slabs which had broken into several pieces. The removal of the loose concrete protrusion revealed a large cavity and several other loose pieces of concrete. He knew that aircraft would be taxiing through the area of damage that morning and was acutely aware of the FOD risk to the engines and the risk of damage to the undercarriage that the damaged surface presented. ■

SES NVG Bay - RAF Benson - Team Commendation

Following the introduction of the new NG700+ Night Vision Goggle, these goggles have encountered a range of engineering issues with aircrew reported problems ranging from difficulty in using the goggles, difficulties securing the goggles to the helmet and some components becoming broken when adjusted by the user.

The Survival Equipment Section collaborated closely with the manufacturer to rectify this issue. Technical analysis conducted by the team identified that over tightening of some screws during the manufacturing process was leading to damaged NVG battery packs. While the battery packs were being replaced by the manufacturer, the team used their professional judgement to assess damage on each set of the night vision goggles until all battery packs were replaced. This ensured that a night vision capability continued to be available to aircrew throughout this rectification process. ■

SES BALCS Bay - RAF Benson - Team Commendation

Following safety occurrence reports about Version 2 of the Body Armour Load Carriage System (BALCS) assembly system, which was reported to inadvertently operate in flight, a risk of crewmen not being adequately restrained within the aircraft was identified.

In a worse-case scenario, there was potential risk that a crewman could fall from a helicopter in flight. The SES BALCS Bay team produced detailed equipment modification recommendations designed to overcome this issue and other concerns including wearer discomfort which could lead to crew distraction in-flight. The team's proposals were incorporated into a technical instruction leaflet released by the equipment Design Team to address restraint system security and robustness. ■

The following is the latest round-up of Safety Centre Awards. If you send us a photo of the presentation, we will print it in Air Clues!

SAC (T) Grant Johnson	RAF Coningsby	Well Done
Sgt Michael Vincent	RAF Marham	SC Commendation
Mr Leigh Stanfield	RAF Waddington	Well Done
SAC(T) Lee Reeves	RAF Waddington	Well Done
Flt Lt Philip Nizinkiewicz	RAF Waddington	Good Show
CES Team	RAF Marham	Good Show
Flt Lt Matthew Douglas	RAF Lossiemouth	Green Endorsement
SAC(T) Robert Caldicott	RAF Benson	SC Commendation
SAC(T) Samuel Latham	RAF Benson	Well Done
FS James Joyce	RAF Waddington	Good Show
Cpl Jess Harris	RAF Brize Norton	Well Done
Sgt Shayne Humphrey	RAF Brize Norton	Well Done
L/Cpl Setevana Radio	RAF Waddington	Well Done
Cpl Steven Collins	RAF Coningsby	SC Commendation
SAC(T) Charlie Jones	RAF Lossiemouth	Well Done
SAC(T) Ralph Weldon	RAF Waddington	Good Show
SAC(T) Connor Read	RAF Odiham	Well Done
Mr Sammy Wood	RAF Boulmer	Well Done
Mr Jon Littler	RAF Marham	Well Done
Mr Jason Skinner	RAF Waddington	Good Show
See-Off Team	RAF Northolt	Well Done
Sqn Ldr Piers Hammond	RAF Wittering	Green Endorsement
Maj Jonathon Bowles	RAF Wittering	Good Show
Mr Martin Robinson I	RAF Northolt	Well Done
Mr Martin Robinson II	RAF Northolt	Well Done
A/Sgt Alex Michel	RAF Cranwell	Well Done
Flt Lt Terrence Jones	RAF Wittering	Green Endorsement
CT Richard Ford	RAF Benson	Well Done
SES BALCS Team	RAF Benson	SC Commendation
SES NVG Bay Team	RAF Benson	SC Commendation
Flt Lt Scott Daniel	RAF Waddington	SC Commendation
Sgt Oliver Napleton	RAF Odiham	Good Show
Cpl Ross Hancock	RAF Odiham	Good Show
FS Matthew Cockett	RAF Scampton	SC Commendation
Cpl Dan Marshall	RAF Akrotiri	SC Commendation
Cpl Aden Turner	RAF Odiham	Well Done
Cpl Craig Blair	RAF Benson	Well Done
Sgt Daniel Heathcote	903 EAW	Well Done
Fg Off James Parkins	RAF Shawbury	Well Done
FS Lee McLaren	RAF Akrotiri	Well Done
SSgt Martin Williams	RAF Waddington	Well Done
LCpl Dylan Cope	RAF Waddington	Well Done
14 Sqn Flt Safety Team	RAF Waddington	SC Commendation
Flt Lt Christopher Goodyer	Sheppard AFB Texas	Green Endorsement

British Forces South Atlantic Islands MPC Air Safety Awards

Sergeant Steve MacArthur - SES-ELW - 905 EAW Commendation

Sergeant Robert Hill - 100 Signals Unit/GRMS - 905 EAW Commendation

Corporal Chris Royle - ATC - 905 EAW Commendation

Chief Tech Michael Gresty - 905 EAW Commendation

The First RAF Air Command **Environmental Awards**

By Lizzy Kijewski, RAF Safety Centre

The Air Command Annual Environmental Awards provide an opportunity to embed our aspirations for developing excellence in environmental leadership. Promoting innovation, best practice and resilience through sustainable development and outstanding performance in environmental protection.

The initiative was commissioned by DCom Ops, launched in April 2020 are was coordinated and led by the RAF Safety Centre (CESO) Environmental Protection Team.

These inspiring new accolades aim to encourage and recognise collaborative projects and teams, raising up individuals going above and beyond and highlighting our commitment to the environment as a key contributor to the wellbeing of our people and the future of our operations.

The context for the launch of the Air Command Environmental Awards is clear and the entries received this year have given a hugely positive reflection of the wide-ranging capability and often personal commitment, to delivering simple but effective outcomes for the environment. With so many excellent entries received, it has proved to be a real challenge to pick only 1 winner in each category! All said, all our excellent nominees have received a special certificate of commendation from the RAF Safety Centre.

The categories for the awards are designed in such a way that they allow a scope for recognition across a broad spectrum of disciplines, such as environmental protection; energy; conservation; waste; and resource efficiency. This ensures that projects or efforts by nominees are not limited in topics and allows everything from the smallest change in ways of working and systems thinking, through to a large-scale innovative project, to be included in an award entry.

Energy Conservation Champion, Individual

The first category of Energy Conservation Champion – Individual, was awarded to Glenn Chatwood for his incredible efforts and personal commitment in implementation of energy management and water saving technologies across the HMS Sultan site.

Glenn joined the team as Energy Manager in 2007, at a site that is home to 3400 personnel covering 208 acres with 181 buildings and 2 Palmerston Forts. Glenn pursued several new projects such as the EBOX voltage reduction system to optimise electrical consumption, whilst also prolonging the life of electrical equipment and delivering lower energy costs and reduced carbon emissions. Further work on the installation of new radiant heating in hangars with controlled temperature and timings, decentralised hot water systems, a new gas main, and a highly effective targeted campaign on triad warnings has reduced electricity costs by £75k, gas reduced by £152k and realised a carbon emissions reduction of 800 tonnes over 8 years. Much of Glenn's work has been driven by Glenn's personal commitment to the delivery of projects, going above and beyond the expectation of his normal daily responsibilities. The judges felt that Glenn's work really embraced the spirit of Energy Conservation Champion, demonstrating real potential and leading the way for projects or processes that will serve as a blueprint for cost effective innovation across wider MOD estates and assets. The work of one individual leading the way to reduce our impact on the environment, as well as delivering significant cost savings. ■

Environmental Champion, Individual

The individual award for Environmental Champion was given to Warrant Officer Graham Spark at RAF Marham. In 2014 RAF Marham began the process of upgrading the Station for the introduction of the F35 Lightning aircraft. Demolition and construction gave RAF Marham a necessity to ensure the local wildlife a place of safety, allowing animals or reptiles found during the work to be rehomed in a suitable location. A pond was built in an area called Ladywood, a disused piece of woodland away from the airfield. Warrant Officer Graham Spark was the Station Warrant Officer at the time and soon took up the mantle of the custodian of Ladywood.

Ladywood

Graham furthered the project through procurement of trees from the woodland trust and was instrumental in establishing the station's 'adopt a tree' scheme, to raise funding to improve other areas of the woodland. A small volunteer force was created and has since planted over 800 native British saplings, all at no additional cost. During the construction phase he liaised with contractors and gained support to turn Ladywood into a conservation area that station personnel, their families and the wider community could access, he quickly brought the Contractors on board with his idea and they built a purpose built bird hide and all weather shelter. The team added a bat detector to their equipment capability

to monitor local bat populations and reclaimed wood for purpose-built seating at no extra cost. The Contractors had built such a good relationship with Graham, they then gifted and delivered all their unused decking, cable drums and wood for future projects.

Service personnel, school children and organised visits make use of the outdoor areas, which are now also used for 'Worship in the Woods', a monthly church service in the open air. Woodcraft workshops, overnight family camping, campfire cooking, bat detecting, school nature trails, Easter egg hunt and Halloween parties are all part of the fun and enjoyment. It is a place of tranquillity which allows nature to flourish alongside operational activity. ■

Bug Hotel

Environmental Champion, Team Award

The award for the best team in the Environmental Champion category, was bestowed upon the eXperimental Innovation Hub based at RAF Leeming.

RAF Leeming, through the RAF eXperimental Innovation Hub (RAFX) has displayed determined to lead from the front in meeting mandated environmental and sustainability goals and to act as a catalyst for similar behaviour across Defence. It is exploiting a broad range of initiatives in conjunction with regional Start-Ups, Universities and the Rapid Capabilities Office (RCO) to deliver opportunities in renewable energy, electric and hydrogen vehicles, carbon capture, carbon footprint modelling and analysis, utilities data collection, and food sustainment – both for healthier living and addressing mental health and well-being issues.

Based in the heart of North Yorkshire, RAF Leeming is ideally placed to interact symbiotically with the environment around it. Project VITAL is core to these efforts and involves the collaboration with focus groups and regional start-ups and universities. Central to this work is developing a model for carbon footprint modelling and, in collaboration with Newcastle University, who are analysing the entirety of the station to understand how to measure its carbon footprint and provide a model which can be shared across Defence.

RAF Leeming's Carbon Net Zero (NZ) enterprise incorporates both carbon reduction and carbon capture. In conjunction with the Renewable Energy Department at Newcastle University the station is examining power diversity through several means. Newcastle and Swansea Universities have developed a new solar cell which no longer requires heavy and cumbersome solar panels but is in a sheet form and

can be affixed to roofs and the sides of buildings. A station survey has also revealed multiple boreholes, many of which are capable of harnessing geothermal heat which can be redistributed to the Station. Similarly, the station has its own 1.5 miles of waterfront onto the River Swale, the fastest flowing river in the UK, where water turbines can be used to harness yet more energy. While these capabilities are still evolving, significant progress has already been made in renewable transportation.

Defence directed an aspiration for 25% electric White Fleet by 2022. RAF Leeming has sought to catalyse this implementation and agreed with the RCO and A4 to acquire 2 electric vehicles to facilitate data and analytics for informed decision making within the business case. It also sought funding for 6 electric fast charging points (the first in Defence) which were installed to coincide with the end of the study period. As a result of this analysis and installation, RAF Leeming has since acquired 12 optimised electric vehicles for use in targeted areas of the enterprise. This places the station at 17% electric White Fleet, and easily within reach of


Raised beds in poly tunnel

the Defence target a year ahead of schedule. Collaboration is now underway with Teesside University's Hydrogen Energy Department to examine the use of hydrogen for larger vehicles, including their use within Green Fleet. Similarly, RAF Leeming is working in partnership with Lime to provide eScooters for its personnel to eliminate unnecessary driving around the station.

The station is also supplementing these initiatives with Carbon Capture. Again, working closely with Newcastle University, the team is conducting an experiment using Remin (an aggregate sourced from volcanic dust) and Biochar (a form of charcoal). An area the size of a football pitch has been divided into 35 segments and each has been treated with varying amounts of each aggregate. Over the course of 5 years they will be regularly measured to understand how much carbon it has absorbed from the site. While in the early stages, within the first month the carbon content of the soil had been reduced by over 15%. Given the large grassed areas of our airfields, this presents a superb opportunity for carbon capture, balancing against those areas where it cannot realistically be reduced on other parts of the station. Furthermore, the station is working with Climate Action North to rewild areas of the estate to allow for better carbon management and sustainability of the local ecosystem.

As a further initiative to encourage a more sustainable base and support personnel eating a more healthy diet, in 2019 the Station received funding from the Royal Air Force Benevolent Fund (RAFBF) to build a poly tunnel, consisting of 70 raised beds and managed by a small team of Whole Force personnel. Within a short space of time, all the beds were snapped up, including several allocated to the station primary school and Catering Flight. It is well known that gardening is positive for mental health, but in order to ensure this effort was then optimised, the station teamed up with the Defence Centre for Mental Health (DCMH) and the Wolfson Centre for Mental Health and Wellbeing at Durham University. A post graduate student is now examining the positive benefits of the poly tunnel on mental health and will share lessons with DCMH to


Beekeping at RAF Leeming

allow similar initiatives across Defence. The initiative has now been expanded to include beekeeping, and two hives have been established at RAF Leeming and will produce their first honey in 2021.

The first Air Command environmental awards have highlighted the breadth of capability, and the passion for environmental protection and sustainability across the whole of the RAF. Whilst the award winners have demonstrated a leading performance – all the entries received were noted for their incredibly high standards and inspirational achievements. From excellence in reducing paper consumption by IT process, reducing textile wastage from uniform and behavioural change campaigns in recycling; through to local nature conservation partnerships, single use plastic alternatives and reducing wastage of first aid supplies. All the entries received are commended for their dedication in paving the way for environmental enhancement.

We now look forward to the launch of the next Air Command Environmental Awards. With the addition of some exciting new categories and concepts – look out for details coming soon and be sure to promulgate the benefits and recognition of the fantastic work of our teams and individuals, as we work together to protect and enhance our natural world for the future.

Air Command Environmental Awards 2021 – open for entries from 1 July 21. ■

AirClues

UKFSC

Civil Insights from the UK Flight Safety Committee

by Air Cdre (Retd) Dai Whittingham, Chief Executive, UK Flight Safety Committee

Interference

Radio frequency interference (RFI) affects both civil and military aviation communities, the latest issue being the potential impact of 5G mobile network transmissions on radio altimeters (radalt). In recent years, a major engineering programme was required to alter the operating frequency of all the ATC radars because of changes in spectrum allocations. At the root of all this is, of course, money.

The civil aviation industry is (in non-Covid times) worth more than £60Bn per year to the UK economy but that bears no comparison with mobile telephony. The bandwidth to be occupied by 5G alone is worth a small fortune to those who will pay to use it but especially to national governments who stand to benefit from the sale of spectrum and from the wider and significant economic benefits that 5G will bring as we move inexorably to greater use of wireless data in all areas of society.

So, who owns what? Why can commercial organisations introduce systems that affect aviation safety? Our problem is that comms, nav and surveillance functions currently sit in the sweet spot for mobiles and, when push comes to shove, it is normally aviation that loses out. Spectrum use is officially coordinated by the UN's International Telecommunication Union (ITU) and it is up to signatory states to ensure compliance. As you can imagine, the ITU does not have heavy aviation representation but it maintains the Radio Regulations, which define:

- allocation of different frequency bands to different radio services
- technical parameters to be observed by radio stations, especially transmitters
- procedures for coordination and notification of frequency assignments by States

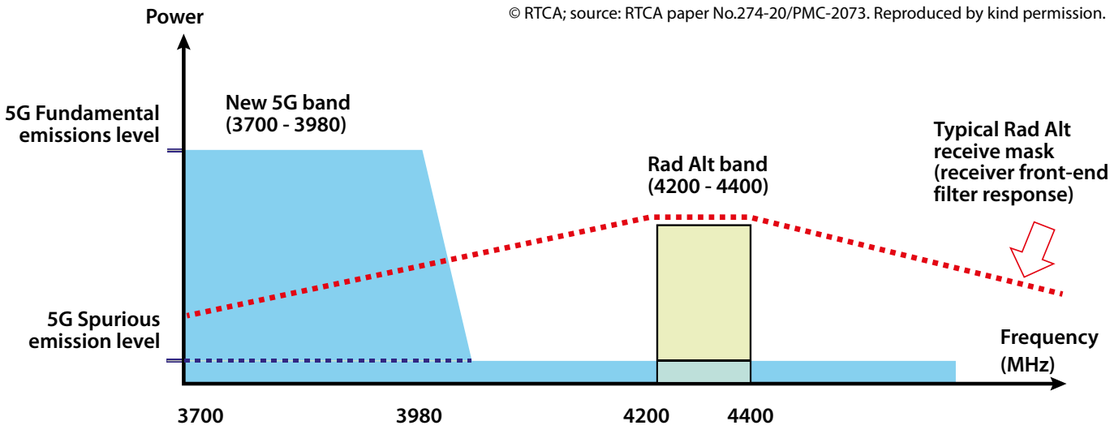
Under an agreement with Ofcom and MOD, the CAA is the band manager for several sets of UK radio spectrum frequencies, including:

- 117.975 – 137.000 MHz (VHF Aeronautical communications
- 960-1164 MHz (Distance Measuring Equipment and Secondary Surveillance Radar
- 2.7-2.9 GHz (Primary Surveillance Radar)

The 4.2-4.4 GHz band, also a sweet spot for mobile comms, is reserved for radalts. This is very close to the bandwidth being used for 5G, and there are validated concerns that spurious transmissions from inadequately shielded masts could generate incorrect radalt indications, as the energy received at the radalt receiver can exceed the mask levels set out in the certification standards. There is also a persistent threat from the space-based 5G signals, which cover the radalt bandwidth as well, albeit at lower power levels. Terrestrial 5G masts have a directional element so that radiated power towards an individual receiver can be higher than with a conventional broadcast system.

Radalts have been in service since 1938 but since then their role has changed markedly from a simple indication of height above terrain. Autoland systems use radalt signals to attenuate autopilot commands in the later stages of an approach, and the radalt also triggers the flare command and subsequent power reduction. Any helicopter with an auto-hover system will be relying on radalt information.

Fly-by-wire systems use radalt outputs to modulate flight control laws, which can change rapidly when close to the ground. A USAF F-35 accident in the USA in 2019 resulted from a pilot-induced oscillation because the control laws were inappropriate for the actual flight condition; the investigation discovered that the various control law modes were not well understood by the instructor pilot, nor by the test-pilot community. You might argue this has nothing to do with radalt interference, but the point is that in normal circumstances the radalt signals would have changed the control law regime and prevented the tailplane system becoming saturated.



On a separate note, the accident report makes for interesting reading if you are involved in fatigue management or other supervisory tasks, and there are lessons about human performance and distraction in there too. You can find the report at https://www.afjag.af.mil/Portals/77/AIB-Reports/2020/May/Eglin AFB F35A

So, what is being done about potential RFI on radalt systems? The RTCA (a US industry technical body) conducted an extensive study, which involved representatives from avionics and airframe manufacturers as well as regulators. The full report is at https://www.rtca.org/wp-content/uploads/2020/10/SC-239-5G-Interference-Assessment-Report_274-20-PMC-2073_accepted_changes.pdf - a riveting read if you are into 'difficult wiggly-amps' but, if you are not, it is still a good indication of the depths to which your engineering colleagues go in ensuring that you have an airworthy aircraft.

DE&S is examining the implications of the RTCA report for all MOD air platforms (a trial has recently commenced at RAF Leeming) and you can expect the MAA to be discussing potential mitigations for any identified risks. However, the primary mitigation for now, whether you are flying a civil or military aircraft, is simply to be aware that your radalt might be telling you porkies because there is no way to prevent the 5G RF energy from arriving at the radalt receiver antenna.

Whilst the CAA will continue to monitor the situation, it has adopted a fairly relaxed stance on the basis that 5G frequencies in the UK will be further away from the radalt band than would be the case in, say, the USA or Japan, and will be at lower power levels, so the risk of RFI is reduced. That is fine in the UK, but of course most aircraft don't stay in the UK FIR. France has already opted to place limits on power output for 5G masts in proximity to civil and military airfields, which will head off some of the expected problems there.

A few commercial operators are using FDM programmes to look for potentially spurious radalt values, though it is still early days and 5G networks across the UK are very patchy. However, airports are a prime 5G target, so if you are one of those who occasionally operate into them (or take your helicopter into a city centre) you need to be aware of the potential for RFI affecting your radalt. This is in addition to existing cautions about high intensity RF transmissions and effects on flight control systems.

Many of you will already have experienced RFI in the form of GNSS jamming in the Nicosia FIR. This is not the forum for discussing who might be doing this, and why, so suffice it to say this is typical of 'grey zone' conflict and it his happening on other parts of the world too. Whether denial of GNSS information is a problem or not depends on your 'error budget': if you are using it to confirm weapon release parameters, avoid a MEZ or put you at a precise position for landing then you could be in difficulties, but on a long transit a few miles of inaccuracy along the way might not matter too much. Unless of course those inaccuracies take you into airspace or across a boundary where you should not be. On which topical note…

There is another form of interference that can affect you. The recent armed intervention against a commercial air transport flight in Belarus airspace has rattled civilian cages rather loudly. Other than the fortunately infrequent deliberate engagements through mistaken identity, there does not appear to have been another instance of this form of intervention since the Chicago Convention was signed in 1944. The treaty affirms the absolute sovereignty of a state over its own airspace but it also gives the right of innocent passage to bona fide civilian traffic, whereas all military aircraft are treated as state aircraft, which is why you need Dip Clearance for some transit flights. Whilst you would expect intelligence inputs would prevent you operating across a state whose willingness to intervene had risen to unacceptable levels, nobody in the commercial sector saw the Belarus incident coming - apart from the Belarussians and possibly a supportive neighbour. It is therefore worth giving a few moments of thought to how you would respond to unwarranted and unexpected attempts to divert you. ■

AirClues

Heat Illness-
Taking it Seriously

RAF Safety Centre

Heat illness is a serious, potentially life-threatening condition. It can affect members of the armed forces, and civilians, performing most activities (operational, training and day-to day tasks), both at home and overseas. So, it is essential that all personnel understand the causes and effects of heat illness. Commanders, line managers and those planning activities must assess the risks of heat illness and take action to reduce and prepare for those risks.

Between 1 April 2010 and 31 March 2020, 2,728 UK Army Personnel, 289 Royal Navy, 318 Royal Marines personnel and 216 RAF suffered heat illness injury. There have been 4 service deaths in the last 10 years. Heat illness is a clear Risk to Life and must be taken seriously by Commanders; in fact, it must be taken seriously by all personnel. Following a 4-month deep dive, single-service wargaming, policy reviews and the analysis of Coroners' reports and other recommendations, JSP 539 has been retired and JSP 375 (Management of Health and Safety in Defence) now provides the policy and guidance on the prevention of heat illness. JSP 375, Chapter 41 (Heat Illness prevention policy) has been produced and published.

It is such an important subject, that we are not going to try to precis how to deal with it here. There is just too much to consider. You are strongly encouraged to read and understand JSP 375 Chapter 41 and undergo any appropriate training as it develops. A Training Needs Analysis was conducted for this and training courses are being designed and introduced.

Annex A to JSP 375 Chap 41.

The new policy applies to everybody in Defence, or anybody who is under the supervision of Defence personnel, both regular and reserve, military and civilian, at home and overseas. A wide range of activities is at risk of heat illness, and these cannot be defined as an exhaustive list. Individuals and Commanders will need to recognise the dangers as they arise. Fig 1 is an example of some of the activities that need to be considered.

Fig. 1

Important Policy Mandates

Policy Statement 1

A commander or line manager must be nominated to command or supervise any activity where the risk of heat illness exists.
Those taking part in an activity must know who the commander or line manager is.

Policy Statement 2

The risk of heat illness must be considered in the risk assessment for all MOD activities. The risk assessment must as a minimum consider the following risk factors:
Acclimatisation; Clothing and equipment; Expected work rate; Environment; Individual risk factors; Education and training; Medical plan; and fluid requirements.

Policy Statement 3

In the case of physically demanding selection events and fitness tests, as well as considering the factors at Policy statement 2:

a. When planning an activity, a Wet Bulb Globe Thermometer (WBGT) forecast and the work / rest tables must be used to inform the risk assessment; and

b. When delivering the activity, a QT34 dynamic reading that is representative of the location of the activity must be used.

For all other MOD activities, as well as considering the factors at Policy statement 2:

a. When planning an activity, a WBGT forecast and the work / rest tables should be used to inform the risk assessment; and

b. When delivering the activity, a QT34 dynamic reading that is representative of the location of the activity should be used.

Policy Statement 4

The controls in the risk assessment must be complied with. If the controls in the risk assessment or any other aspect of this policy cannot be complied with, but the activity must still proceed, the risk must be elevated.

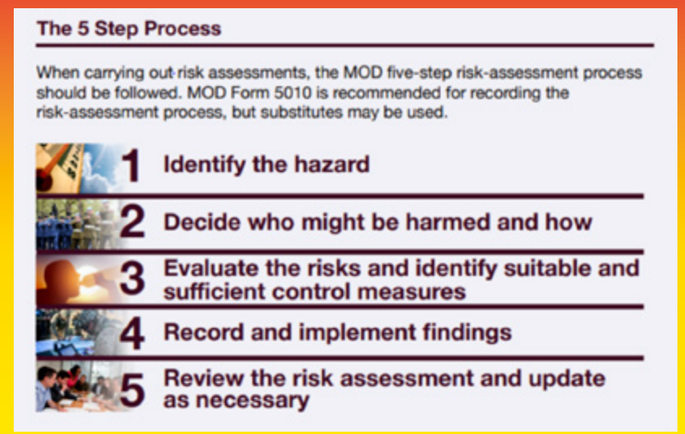
Policy Statement 5

All activity must be dynamically risk managed. If heat illness symptoms are observed:

a. The activity must be paused, must be dynamically risk assessed and further mitigations must be applied;

b. The activity must only be restarted once further mitigations have been applied and with the approval of the commander or line manager at Policy statement 1; and

c. All suspected and confirmed heat illness casualties must be reported and investigated in accordance with TLB Policy.



Policy Statement 6

Those involved in planning or undertaking activities which involve risk of heat illness must receive suitable training.

Hypothetical Example of Heat Illness Policy Compliance

Security Force Operations **An Example of a Dynamic Approach to Maintaining Operational Capability**	
Exercise Director: OC 8 FP Wing	**2* Risk Holder:** AOC 2 Gp
OIC Activity: Stn Sy O RAF Cottam	**Risk Assessment Signed off by:** Stn Sy O
Risk of Heat Illness: Medium	

Situation:

1. The Force Protection Force Commander has formally appointed, in the FP Force Total Safety Management Plan (TSMP), OCs of the RAF FP Wgs as the Exercise/Activity Directors for their respective Wings' activities. The TSMP also formally appoints unit cdrs, sub-unit cdrs and team leaders as activity commanders and directs the FP Force's adoption of the Heat Illness Policy, including its planning and management procedures. OC 6 Sqn RAFP and her Sy Flt Cdrs, based on their respective stations, all fall within the TSMP direction and, as such, the Flt Cdr of the Sy Flt at RAF Cottam has ensured that the Wings' procedures dovetail into the RAF Stns and that the RAF Stn Safety & Environmental Management System (SEMS) contains all the required orders and procedures to meet the Heat Illness Policy, including generic risk assessments (RA) for all the security operations on the base (guarding, patrolling, QRF and MWD).

2. At 1100hrs, the Stn Sy O arrived at the guardroom and informed the Guard Commander that the Security State has just been raised to 'Exceptional' and that he was to immediately implement the plans contained in Stn Orders. The Guard Commander issued orders to his junior commanders, who immediately live-armed all personnel and instructed full PPE with helmets. Having completed the move to the new increased alert state, the Guard Commander proceeded to undertake a review of his patrol plan and guarding levels. At 1300 hrs, the PEd staff contacted the guardroom requesting that a tannoy be issued to inform the unit that the Gymnasium WBGT reading had just been recorded at 20.5 and that the unit was to implement heat management plans.

3. At 1330hrs, the Guard Commander was called to the Main Gate by the cover guards the MPGS vehicle searcher, who had been in the open for 1.5 hours, had been seen to be unsteady on his feet.

Mitigation:

1. The Guard Commander immediately commenced a dynamic Risk Assessment to ensure that he had the appropriate control measures in place to govern the change in WBGT levels.

2. The dynamic Risk Assessment indicated:
- No reduction in the time on guard duty.
- A reduction in patrolling activity adopted a revised posture of 20 minutes patrolling and 40 minutes rest, up to a maximum of 4 hrs.

Applicable Policy: JSP 375, AP8000 Leaflet & FPF TSMP

Actions On:
1. The Guard Commander immediately deployed to the Main Gate with a replacement guard and: replaced the vehicle searcher, brought him under cover, removed his body armour and commenced cooling procedures.

2. Whilst monitoring the individual, he requested assistance from the duty medic.

3. Following the event, the Guard Commander completed an accident report form F7454A, reporting the suspected heat illness and sent this onward to the Stn Health & Environmental Advisor.

4. The Guard Commander then commenced an internal review of his and the Guard Force's actions to produce a Learning Account.

Heat and Cold injury Reporting and Investigation Requirements

There are three categories of heat illness (reporting requirements of each, in bold).

- Mild heat illness – heat illness with no other illness (for example, gastroenteritis), and the casualty does not need to go to hospital or is discharged from the Emergency Department. A Unit Investigation must be carried out.

- Moderate heat illness – heat illness which requires the casualty to go to hospital and be admitted from the Emergency Department. Examples include a change of consciousness for more than 15 minutes, seizure, or evidence of organ damage or rhabdomyolysis. A single-service or TLB non-statutory enquiry (NSI) must start, in line with TLB investigation procedures.

- Severe heat illness – heat illness requiring the casualty to be admitted to intensive care. A single-service or TLB non-statutory enquiry (NSI) must start, in line with TLB investigation procedures.

For additional details of reporting requirements, refer to JSP 375 Volume 1 Chapter 16 and Chapter 41.

All suspected and confirmed heat illness cases must be reported in line with single-service or TLB incident-reporting procedures and the responsibility for doing so rests with the chain of command. Cases should be reported and recorded as suspected, until formally diagnosed as heat illness by a doctor. As a minimum, reports should specify the time, location, WBGT reading, weather forecast (if available) and type of activity being undertaken. Personal details of the casualty should include their name, rank, service or staff number and a description of the illness or injury.

The chain of command must report all suspected or confirmed heat illness cases to the Defence Accident Investigation Branch (DAIB) and, where appropriate, a preliminary investigation must be carried out. Cases can be reported to DAIB on their Land Duty phone line (030 679 86587 or 9679 86587) or their Air and Maritime Duty phone line (030 679 88276 or 9679 88276).

Reporting Culture

The reporting of heat and cold related injuries will build a model that can then be used to improve the way units conduct their activities and enable us all to have a greater understanding of what went potentially wrong, so that control measures can be implemented at earlier stages to prevent the injury occurring in the first instance. ■

JSP 375 Chapter 41 - Heat Illness Policy
JSP 375 Chapter 42 - Cold Illness Policy

I Learnt about Overload from that

By WO Ian Phillips, ATC, RAF Waddington

As this incident took place several years ago, for the benefit of the younger readers, I have taken the liberty of substituting Traffic Service (TS) for Radar Information Service, Deconfliction Service (DS) for Radar Advisory Service and Swanwick(Mil) for LATCC(Mil). Otherwise, the following words are as close a description as I recall; which, as it continues to chill my blood each time I think about it, still seems as though it could have happened just last week.

In January 2004 I was a FS Air Traffic Controller at Rutland's premier Harrier base. I was fully endorsed in all control positions (except Supervisor – we didn't have FS Supervisors back then). I had several tours under my belt, mainly at FJ units and, according to my annual reports, was an above average controller. That said, as I found out on the day in question, everyone has their limits.

Cottesmore, as with most ATC units at the time, had its problems with manpower. Not necessarily with the number of controllers in the tower, but certainly with the number of controllers holding all the endorsements required to give everyone on duty a fair share of the workload. Besides the Supervisor ticket, there were 9 controlling endorsements to be had at Cottesmore (we did all the search radar work for Wittering also). Cottesmore Approach, Cottesmore Director and Wittering Approach/Director were the three most demanding and difficult endorsements to attain and, therefore, the controlling positions which lacked any large amount of readily available, qualified controllers. Thus, it was frequently the case, when traffic levels permitted, that these positions would be band boxed in some configuration or other. It was either that or day in day out the same controllers would man those positions for hours on end with little prospect of a break. The Supervisor on the day in question (we'll call him Chris) studied the flying programme and, in order to facilitate lunch breaks, asked if I would combine Cottesmore Approach with my current task of Cottesmore Director so that my colleague (we'll call him Dave) could go and grab some lunch. Naturally, I said I would as I knew Dave would do the same for me and probably at some point soon was going to have to so that I could get lunch. The programme didn't look all that onerous – several formations and singletons out and about, but if they recovered as planned , it wouldn't be a huge challenge – I'd work about half of them and then Dave would relieve me and he could deal with the other half.

The weather was a bit awkward. There was a substantial layer of cloud with a base of around 1800', which was okay for visual circuits, and the tops were about 3500'. Therefore, it was likely that the recovering aircrews were going to require a Deconfliction Service as they descended through cloud. The flying programme was not an accurate reflection of the rate of recoveries! Everyone seemed to want to come back early. My workload ramped up fairly quickly after the first free call – a Harrier which I'd seen wearing a Swanwick (Mil) squawk, change to 7000 and then contact me to conduct some General Handling in the local area prior to recovery. I identified the Harrier and, as requested, provided a Traffic Service (which was limited for weather clutter) between FL80 and FL240 (yes, Terminal controllers could work that high back then). Two other recoveries were soon on frequency. An unprenoted pair from Swanwick (Mil) and a singleton free call - all of which required PARs and, as anticipated, Deconfliction Service.

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With the busy Cranwell and Barkston Heath radar circuits close to Cottesmore's, coordination between the Directors involved was commonplace and was frequently achieved by proxy, in that the Supervisor and/or Approach controller would absorb some of the Director's workload by resolving conflictions well in advance and coordinate traffic accordingly. That plan of action would normally be communicated to the Director by whoever had put the plan in place reaching across to the Director's radar display and pointing out the aircraft involved and stating the agreed course of action. Much to my relief, Chris was on top of any coordination that was needed between my recoveries and the Cranwell/Barkston Heath traffic. With that aspect covered, I could concentrate on getting the Harriers sequenced and positioned for their PARs. More Harriers joined the spree for the radar pattern and thus a Deconfliction Service. Quote from the (spoiler alert) Airprox report: "....the scene changed markedly and Approach became extremely busy very quickly." I agree. With the weather being as it was and the Harriers recovering with plenty of fuel, it was no surprise that the majority of the pilots' intentions were "touch and go for further radar". My internal voice was saying: 'No, just land off this one, you can hear that I'm busy!' Outwardly, on the R/T, I did my best to remain professional, acknowledge the request for more radar approaches and pass the requisite departure instructions.

I should at this point illustrate for those not familiar with working with Harriers how life for ATC could be at times. It seemed to many of us controllers that the Harrier pilots would not land until their fuel reserves were at an absolute minimum. After all, why not stay airborne when you can and go up-diddly-up-up? There's fun to be had in a Harrier which has plenty of fuel! There was also the opinion in ATC that whenever there were two or more Harriers in a circuit, one had to outdo the other(s) in some way e.g. being the first to opt for something clever such as 'STO-hop the main, translate, VL the concrete, option the northern'. Any other Harrier pilots in the circuit hearing this would immediately have the same intentions and attempt to execute them more efficiently or trump that manoeuvre with something more elaborate. It was also common in the visual circuit, for example, for 'Getsum2' to call "downwind, touch and go and then out to radar" and his mate, who was already ahead on the finals turn, to think 'ooh, that's a good idea - I'll do that, too before you will, so there' and pipe up with 'Getsum1, finals, gear down and I'm going out to radar off this one as well'. This gave the Aerodrome Controller little time to warn the Director of the extra trade coming his way and even less time for the Director to relay to the pilots via the Aerodrome Controller how he wanted them to climb and position into his pattern. On switching to the Director's frequency, the Harrier pilot would be identified, given confirmation of the heading and height he should fly and, if it was possible to calculate, what number in the pattern he was. The perception we got in the tower was that a lot of the pilots were never happy unless they were number one.

Chris was fielding calls from the Aerodrome Controller and frantically writing flight strips on my behalf (some of them were fairly legible). I was still rattling off instructions and information to the Harriers in the pattern, coordinating with Cranwell/Barkston Heath when I could and doing my best to keep on top of the mayhem. Remember the Harrier doing GH between FL80 and FL240? I hadn't. In all the chaos of sorting out the Deconfliction Service recoveries and those coming off the runway for radar, I had been

drawn into tunnel vision which was focussed on that chunk of airspace with the most demanding requirements. All my capacity was being used by the aircraft under Deconfliction Service, keeping them safely coordinated and sequencing them so that there was a workable track distance between each aircraft for the PAR controllers. Chris had fallen into the same trap – by doing his best to help me deal with those aircraft that had the higher priority, he'd lost sight of the other tasks in the room. He and I both froze momentarily when the pilot conducting the GH said, "just passed very close to a Tornado.....". Use your imagination to come up with a word that I used to describe the situation. I'm sure Chris used the same word.

Twenty miles ENE of Cottesmore, the two radar contacts had just parted; their primary returns were way too close for comfort as were the Mode C readouts. The Tornado had come out of the east end of the Lichfield RVC and was quietly on its way back to Marham under TS. I am indescribably grateful to the Swanwick (Mil) controller who twice passed traffic information to the Tornado crew on the Harrier and enabled them to have a Cat C Airprox and not something more serious. Chris called for Dave to curtail his lunch break and come back in to relieve me so that I could gather my thoughts and file my part of the report – it was called an Air (C) back then, long before DASORs.

I was sorely disappointed that I'd allowed the Airprox to happen and racked my brains to understand why and how I had got myself into a situation whereby I was so overloaded that I didn't speak up and say to the Supervisor that it was time to forget lunch breaks and split out the Approach and Director tasks. Of course, if I had known that my capacity was going to be overextended then I would have spoken up a long time before anything like an Airprox happened. With hindsight there were several other things I could've done to alleviate the high workload I was under. I could have said to the pilots who wanted to continue flying instrument patterns, 'Negative, owing to controller workload, your options are join the visual circuit or land.' The same should have applied to those already in the visual circuit who wanted to 'come out to play'. That said, I must refer to my paragraph above describing the nature of Harrier ops and the associated perceived pressure of giving them what they've asked for – it'll be easier than arguing or explaining why not on the R/T. There is a comment in the Airprox Report Summary which suggests that I could have given the Airprox Harrier to Swanwick (Mil) for its GH. My (printable) reply to that suggestion is: as it had recently come off their frequency to mine and being so close to Cottesmore, what sort of reply do you imagine I'd have received from the Swanwick end of the landline if I'd gone to them with an unprenoted handover on a jet that was due to recover in the next 15 minutes? Assuming I could find the time to conduct an unprenoted handover! Yes, I should have realised that my capacity was reaching its limit sooner and I should have flagged up the need for Dave to get back in and take some of the strain before safety was compromised. However, being aware that your capacity is about to be less than a match for the workload is a difficult thing to recognize and it can also be a difficult thing to admit to.

I was involved in a second Airprox during that tour – Harriers vs. a KC135 and most certainly nothing to do with my capacity or skills, I'm in the clear on that one! Since then I've moved on through area radar duties at West Drayton and Swanwick, back into Terminal and the Supervisor's role. I've also become very aware of both my and other controllers' capacity to deal with the situations that are thrown at us. As a Supervisor and controller I am frequently involved in the band boxing of duties at my current unit in order to provide breaks, but in view of the fact that the manpower problem I described at the beginning of this article is still prevalent, I will not hesitate to identify the need to split those duties and man the control positions appropriately well in advance of anyone's limits being overstretched. Another quote from that Airprox report: "Under manning in ATC is always of concern to the Board, particularly if it leads to degradation in service". Of course, that wouldn't be the case in 2021, would it? If you fancy a read of the official Airprox Report, its number is 001/04. In the meantime, my advice: firstly, don't be embarrassed to speak up and say that you could use a bit of help. Secondly, don't be afraid to say, 'Sorry, I'd like to help facilitate your desire to go up-diddly-up-up for the umpteenth time, but I really am too busy and it would be safer if you just landed'. ■

RAF Launches Subsidised **BikeSafe Workshops**

RAF Safety Centre

Who is it for and is it free?
Funded BikeSafe workshops are available to RAF personnel (Regular and Reservists) and military personnel working in the Air TLB. Civil Servants employed within the Air TLB are also eligible. The subsidy means that there is no cost for eligible personnel to attend an RAF BikeSafe workshop.

To provide geographical availability, BikeSafe offers eligible riders from Air the opportunity to attend regionally facilitated workshops, delivered via 34 Police Forces across the UK and Northern Ireland (currently unavailable in Scotland).

Air Command A4 MT has been awarded internal funding to facilitate subsidised BikeSafe workshops across the TLB from 28 Apr 21 through to Financial Year (FY) 2024/25. BikeSafe is a National Police run motorcycle initiative, aimed at working with motorcyclists in a relaxed environment to raise awareness of the importance and value of progressing on to accredited post-test training. The workshops have been endorsed by CAS in conjunction with the RAF Road Safety Strategy to help mitigate the Risk to Life from Road Traffic Collison's (RTC) which continues to be a habitual killer within the RAF.

The national BikeSafe scheme has been identified as a key mitigation measure to help to reduce motorcycle fatalities. The RAF workshops involve an observed ride with an advanced Police motorcyclist or approved BikeSafe Observer. With some local variation, the workshops aim to cover rider attitude, systematic methods, collision causes, cornering, positioning, overtaking, braking, hazard perception and use of gears.

Photo Credit: PC G. Dennis, Bikesafe National Coordinator

Further Information and Booking Workshops
A total of 130 workshops have been funded for FY 2021/22. To purchase a subsidised workshop, personnel are to book directly through the RAF BikeSafe webpage (bikesafe.co.uk/raf/) and use the following e-voucher code where prompted: RAF-001-2021. Although you are being asked to go through a 'purchasing' transaction, the voucher code will mean the payment is zeroed.

Additional information regarding BikeSafe and booking RAF specific subsidised workshops is available on the RAF BikeSafe webpage. ■

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The What, Who, Why and Future of Aeronautical Information
(the unsung saviour of the air!)

By Sqn Ldr Will Brooke, former XO, No 1 AIDU

The 'What' and the 'Why' is easy….. Aeronautical information (AI) is the timely, accurate and relevant data used by the air user communities, in order to execute their business in a safe, expeditious and efficient manner. AI can come in an enormous variety of formats both digital and paper, mapping and written word.

AI products are compiled by several agencies. In the case of UK Defence, the No 1 Aeronautical Information Documents Unit (No 1 AIDU) based at RAF Northolt and the Defence Geographic Centre (DGC) based at MoD Feltham are the two primary organisations who collate data to be published in AI products. Other external agencies are also key to the compilation of AI. For example, Ordinance Survey provides a significant amount of data, predominantly topographic information, utilised in special air charts. There is also a significant amount of co-production work with allied partner nations within the international Five Eyes community. This co-operative activity will likely increase in the future, as we embrace new data sharing technologies as part of bilateral programmes.

No 1 Aeronautical Information and Documents Unit (No 1 AIDU)

Now to the 'Who?' First, a bit of history. No 1 AIDU was established in 1953 to provide information on airfields, communications and navigational aids for the benefit of aviation safety. The unit moved to RAF Northolt in 1956 from the neighbouring RAF West Ruislip station. Today, in its current guise, No 1 AIDU comprises of approximately 75 RAF Air Cartographers and 30 Civil Servants.

No 1 AIDU's mission is to provide AI products in support of UK Defence objectives. The unit forms part of the National Centre for Geospatial Intelligence (NCGI) which in turn is part of Defence Intelligence (DI). No 1 AIDU compiles and distributes AI to all MOD aviation assets and global allies in many different formats, digitally and hard copy. The Unit works to an internationally mandated schedule known as the Aeronautical Information Regulation and Control (AIRAC) cycle. Having global unity in the timing of production ensures the most up to date and relevant AI is sourced and collated for air users. Data is harvested from a wide variety of global organisations. It's collated and formatted into products that are easy to use, both digital and hard copy, with the former being the increasingly demanded from UK Defence assets. No 1 AIDU therefore compiles data formats and raster images (digital snapshots) of our products for specific uses among the aviation community. Our digital products which run concurrently with our printed products, are available through our online digital distribution service, Military Flight Information Publications, known more colloquially as MilFlip. Well over a quarter of a million printed documents are produced and distributed by the unit each year.

No 1 AIDU 2020 Printed Document Stats:	
Books (En Route Supplements, etc)	177,531
Charts (En route charts, low flying charts, etc)	161,588
Terminal Approach Plate Booklets	24,963
Total	**364,082**

Defence Geographic Centre (DGC)

DGC is the land focussed sibling of No 1 AIDU and was featured heavily in Issue 34 of Air Clues. Based at MOD Feltham in Middlesex, its mission is to deliver geographical information (GEOINF) and intelligence (GEOINT) in support of UK Defence objectives. Its primary role is to provide land maps, aeronautical charts, positional information, geo-referenced imagery. Just like No 1 AIDU's products, the demand for printed maps and charts continues alongside an expected growth in the demand for digital data to support our data hungry Defence hardware.

Unlike No 1 AIDU, DGC is a largely civilian organisation headed by a Director from the Civil Service. Of the 400 personnel, just 14 are military, providing a highly reactive customer service to meet the fast and changing pace of Defence user requirements with a 24/7 map supply service. DGC is also home to the MOD Geospatial Library which houses over 700,000 different maps, air charts, and other geographic sources which are readily available to defence customers. The MOD Map and Air Chart Depot holds stock to support UK contingency planning requirements and bulk map stocks to meet current operational requirements. The depot provides a 24/7 capability and stocks are dispatched using the defence logistic chain or, if required, using couriers anywhere in the world.

Jointery at its finest

So, how do these two agencies divide responsibilities and combine efforts to produce the AI products that you may be familiar with as a user? As a relative AI layman myself and non-Air Cartographer in an Air Cartographer's world, I can best put it in this rather simplified way: if it's attached to the ground, be it a pylon, tall building, wind farm, radio mast or other such physical obstacle, then that sits firmly in the ball park of DGC to collate positional and dimensional data on. If it's in the air or specific to an airfield, such as airways, nav-aids, runway info, corridors, restricted areas etc. then that responsibility rests with No 1 AIDU to gather, compile and distribute information on. However, for aviators and other air users to get the full picture, a significant amount of AI products is very much a collaborative effort between them. With the 2 agencies data sets combined and layered one over the other, they give air users a more accurate picture of the airspace within which they can operate. A 3rd layer is applied to some of our special air charts, including our Low Flying Charts. This is the topographical data, which is provided by Ordinance Survey. With the 3 layers combined, you end up with a busy, but useful product, enabling air users to conduct their business safely. For example:

The Future is bright

AI has seen enormous technological advances since the formation of No 1 AIDU way back in 1953 and we continue to embrace advances in capabilities today. Future proofing the business of aviation safety is achieved by seeking out innovative ways of harvesting, sharing and publishing AI. One of the most significant advances will be in GEOINT interoperability, working with the US and other FVEY partners through the 'PICASSO' programme.

There are many sub-projects within this collaborative programme which include the PICASSO Aeronautical Information Capability (P-AIC). This will modernise and partly automate the production of safety critical and highly regulated aeronautical information.

The vast range of benefits directly and indirectly enabled by PICASSO will include:

- UK access to US National Geospatial-Intelligence Agency (NGA) produced mapping and archives. NGA provides the UK with circa 2000 products per year; access to a vast global map archive and high-resolution elevation data.
- Air Safety of Navigation. The UK and US have a strong and enduring co-production relationship for updating aeronautical information, with collaborative efforts between No 1 AIDU and NGA. NGA provide circa 29,000 updates per 28-day cycle against the UK contribution of circa 7,000.
- Imagery. The UK accesses circa 1.5 million US-funded images per year with an estimated equivalent purchase value of circa £4Bn. This fundamentally underpins the UK GEOINT capability and, regardless of cost, could not be replicated by purchasing commercially available imagery.
- Analysis. The UK has access to GEOINT products created by more than 3,000 US analysts and benefits from access to significant US investment in tradecraft and tools including Automation, Augmentation and Artificial Intelligence (AAA).

PICASSO is an enduring programme providing UK Defence with equipment capability for the Processing, Exploitation and Dissemination (PED) of GEOINT. It enables a range of unique capabilities that enables Defence to understand, plan, navigate and target. Crucially for us, these include the production and dissemination of AI. Additionally, the airspace and geospatial analysis capabilities will enhance Air C2 environment through imagery, FMV and other GEOINT collection capabilities. The programme was deliberately implemented to give the flexibility and responsiveness required to upgrade and evolve UK capability as and when required to maintain interoperability with the US and FVEY partners. This remains vital and steps are being taken to increase responsiveness.

In short, the imminent implementation of P-AIC will be an AI gamechanger for AI producers and air users alike, exploiting technology to enhance the efficacy of AI across Defence. ■

UK Military Flight Information Publications (MilFLIP)

By Cpl Tim Mackay, No 1 AIDU

The MilFLIP website is AIDU's digital delivery platform and can be found easily via Google or directly using this URL: https://www.aidu.mod.uk/Milflip/. Developed in-house by RAF Air Cartographers, MilFLIP is a crucial part of the RAF's efforts to modernise the way we operate.

Traditionally, once an AIDU product is ready for production, it is sent off to be printed and bound before entering the postal system for delivery. Even products such as Flight Management System datasets would be burnt to a DVD and physically delivered. This whole process is lengthy and, especially for DVDs in transit, provides easy opportunities for sabotage. AIDU has applied innovation to its internal production processes over the years to enable MilFLIP to host TAP Charts and booklets, En-Route and Low Flying products, Digital Mapping, FMS data and other third-party products.

For squadrons that have the capability to utilise digital products, whether through ingestion into their aircraft's systems or even just to print off a bespoke TAPs booklet, the immediacy of MilFLIP can make all the difference. No matter where you are in the world or what device you're using, with an internet connection and a MilFLIP account you have access.

To make MilFLIP as accessible as possible, we use Transport Layer Security which is an industry standard security technology for establishing an encrypted link between our web server and your device. Simply put, access to MilFLIP is as secure as your online banking! Combined with our restriction to not upload anything above Official Sensitive this allows us to stay off Modnet (think SharePoint etc) and be fully available on the Internet. So, if you're laying over in some corner of the planet with a personal laptop and your own phone as a hotspot for internet, you've still got access!

UK Defence and five-eyes personnel get free access and need only sign up for an account using their work email address. You can sign up for MilFLIP by navigating to the login page and clicking the 'New User' button. ■

No 1 AIDU Safety Assessments

What happens when we change a chart?

By Jane Kelly, Safety & Quality Manager, No 1 AIDU

Many of the products compiled by No 1 AIDU are used for a variety of purposes and by a variety of fleets. They are 'one size fits most' in their nature. This is beneficial as it allows transfer between platform with ease, but they are not always the bespoke solution that everyone needs.

No 1 AIDU and DGC do not have many front-line operators in their ranks. They will produce charts based on the stated requirement but the nuance of what is needed is not always apparent. Nevertheless, there must always be a drive to improve the product set and rectify any shortcomings. But what happens if a change is made that could have adverse consequences? That's where the Safety Assessment process kicks in. In 2020 No 1 AIDU embedded Organisational Safety Assessments (OSA) into our Air Safety Management Plan. The Unit will convene an OSA whenever projects are envisioned that will change the working practice of Air Safety critical workflows or methods. It could be that these projects will negatively impact Air Safety, and this should be quantified and reported early in the process. The OSA will take the form of a safety assessment document, followed by an internal meeting within No 1 AIDU. The safety assessment will then be sent to Front Line Commands, shareholders and experts with the aim of identifying risks to critical air outputs such as AIRAC.

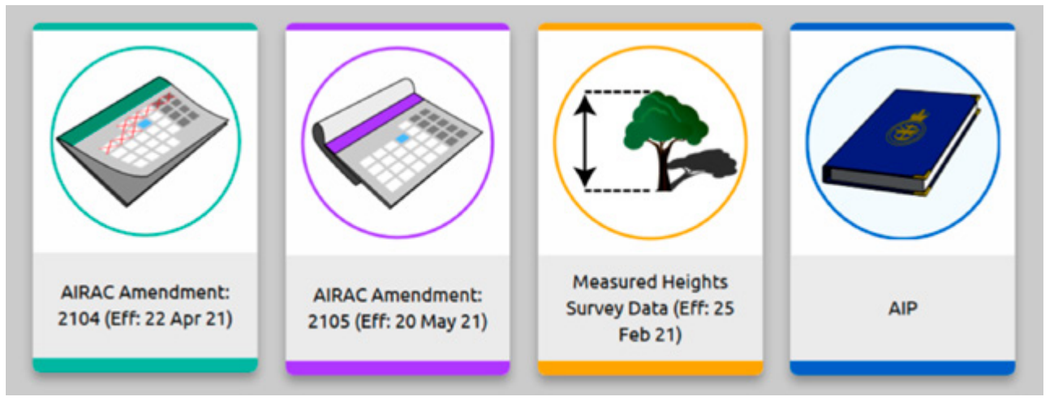
The main points we consider when a change is to be introduced is:

- Describe why the change is desirable.
- What hazard are defined by not introducing the change.
- Has there been any undesirable Event - such as a DASOR Report or investigation?
- List all the actions required to ensure the preventative controls.
- Provide different options to be considered.

These assessments are targeted at safety organisations within FLCs who will comment as key stakeholders in the change. Inevitably, they will go to individual units within their command for comment and advice to get the boots on the ground view on the changes. This is your chance to have your say but bear in mind that the products are inevitably a compromise.

The system is not fool proof, but we are improving it all the time. The first of these OSAs was on the portrayal of suspended cables. We were only able to produce an interim solution quickly as the software changes for our long-term ideal are time consuming and expensive. What we didn't factor in is how the charts would appear on in cockpit mapping, particularly those converted with the out of date compressed ARC digitized raster graphics and ARC standard raster product mechanisms. If your cockpit chart looks bleached out, it probably is one of these two formats and, as always, cannot be relied upon without reference to paper. We have improved our OSA process to consider all outputs of the change as a consequence of this.

An Organisational Safety Assessment shall be closed when the operating procedure is no longer required, or the procedure is incorporated into policy/local orders. All OSA's will be reviewed 3 months after closure to ensure the changed product meets the demands of the users. Our expectation is that this process will help us make effective changes that have an overall positive benefit with greater input from FLCs. Other articles within this issue will elaborate on the mechanisms you can use to change the product set and on the limits of digital mapping. ■



AirClues

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Aeronautical Information Requirements

How to get someone to listen to you when you want your chart to be better!

By Sqn Ldr Jim Maginnis, SO2 Aero JGI, Jt User

In the bygone days of yore when I was operational, Aeronautical Information (AI) was something that appeared in Flight Planning on a somewhat regular basis, and woe betide anyone who hadn't got their maps (yes, the old fashioned paper versions) CALF'd, or their Docs in date, or CHAD'd; and that was not just before the Trappers were due.

For most aircrew No 1 AIDU was just a vague concept located at RAF Northolt, and as for the Defence Geographic Centre (DGC) that was something a select few were aware of, situated somewhere near the Feltham Young Offenders Centre!

Then, and probably this argument is still as valid today, we accepted what we were given and didn't really mind where it came from, just as long as it was (reasonably) accurate, up-to-date, and fit for purpose.

In hindsight, if the Trappers had asked us about JSP 465 then undoubtedly most of us (and you) would have looked at them blankly. As for the Aeronautical Geospatial Requirements Group (Aero GRG)… nope, not a clue.

However, times have changed, and as I am now flying my 'wooden bomber' as SO2 Aero at Joint Geospatial Intelligence (JGI) in Joint User Intelligence and Cyber (JU Int & Cy) HQ within UK Strategic Command, I find myself Secretary to the Aero GRG and also author of the AI Sections of JSP 465 (Defence Geospatial Information Policy). Consequently, I have to understand these policy driven processes, and how their tenets and outworking can assist those of you currently on the front line to obtain the AI that you actually require to operate safely and deliver military effect.

JSP 465 - Defence Geospatial Information Policy

JSP 465 is 'helpfully' divided into two main parts with several sub-divisions; however, the two main sections that concern us today are:

a. **Provision of AI Support to UK Defence.** This is currently at Chapter 6 to Section 1 to JSP 465 Part 2 Volume 1 - Provision of Aeronautical Information Support to UK Defence (v1.0 dated Apr 18) and;

b. **Terms of Reference – Aero GRG.** This is currently at Chapter 8 to Section 2 of JSP 465 Part 2 Volume 1 – GRG (v1.0 dated Apr 18).

Provision of AI Support to UK Defence

'Chapter 6' details Defence Policy for the regulation and provision of AI, including the responsibilities of the supporting organisations and working groups.

It's well worth a read because it describes the 'what' the 'who' and the 'how' of AI and the method by which you can influence what both No 1 AIDU and the Geospatial Aeronautical Information Team (GAIT) at DGC deliver.

'Chapter 6' also gives details of AI Safety and Assurance and the current (as at Jun 21) regulatory process for AI. However, in the near future this will change. Defence Airspace and Air Traffic Management (DAATM), co-located with the CAA at Gatwick airport, have assumed responsibility for AI Regulatory measures and, around summer 2021, DAATM will be publishing JSP 495 that will subsume inter alia the Regulatory paragraphs of Chapter 6.

Change to Product Specification or Requesting New Products

If you feel that the AI that you have currently doesn't meet your needs then there are a number of ways to amend extant AI or to request a new service/product.

For flight safety related observations, inconsistencies or errors the user should immediately raise the issue to No 1 AIDU and DGC via the DASOR process.

For routine or general AI observations that are not flight safety related, these should be reported via MilFLIP (the No 1 AIDU MIL AIS Product Dissemination website).

However, any request for a new service/product needs to be raised to the Aero GRG via your appropriate Functional Customer Group (FCG) chair (there are six FCGs: Navy Command; JHC, No 1 Gp RAF ; No 2 Gp RAF; No 2 Gp RAF Battlespace Management; No 22 Gp RAF. For contact details of the FCG Chairs see the details on Page 30.

Aeronautical Geospatial Requirements Group (Aero GRG)

The Aero GRG is one of four executive sub-groups of the Defence Geospatial Management Board (DGMB).
The objectives of the Aero GRG, which meets at least every six months are to:

a. Oversee the capture and prioritisation of new requirements for Aeronautical Information (AI) from the Front-Line Commands (FLCs) and consider changes to existing AI products and services.

b. Act as a conduit for the FLCs to raise any (non-urgent) AI safety issues. (Urgent safety issues should be raised immediately using a Defence Air Safety Occurrence Report).

And the role of the Aero GRG is to:

a. Provide a regulatory and policy framework to ensure JSP 465 is applied across the air/aviation communities.

b. Integrate new customer requirements with the standing aeronautical requirements.

c. Collate customer concerns and issues with respect to the level of assurance of the quality, timeliness and reliability for provision of aeronautical products.

d. Rule on any issues that remain unresolved at the Functional Customer Group (FCG) Level and escalate to the DGMB (via the Foundation GEOINT Board (FGB)) where agreement cannot be achieved.

e. Update members on policy changes resulting from new legislation (Eurocontrol/CAA) and collaborative engagement (ASG/NATO) concerning aeronautical products.

The FCG Chairs discussed above are mandated to contact representatives from each of their AORs around four to six weeks ahead of the Aero GRG and then report any future requirements to the Aero GRG for consideration. Therefore, if you require any new products then you should feed these in (with as detailed justification as possible) via you FCG chairs. ■

BrightEyes & Be Seen Be Safer

By Gillian McGlinchey, RAF Safety Centre

Royal Highland Show 2019: Gillian (Centre) with 2 BHS Members. Photo by Julie Hanna. Reproduced by kind permission.

The stress caused by the proximity of low flying aircraft and horses will forever be an issue. Helicopter pilots in particular are sensitive to the effect that aircraft noise can have on horses, and not least to the risk of unseating a rider. It was recognised some time ago, largely due to the hard work and research by RAF Shawbury staff, that horse riders wearing hi-visibility clothing in rural areas can give pilots half a chance of spotting them and taking some avoiding action. Horse riders traditionally wear hi-visibility clothing if out for a hack on public roads, for obvious reasons. But if they are largely staying in the countryside, then there is a larger number of riders who don't wear hi-vis because they are not aware of the difference it can make to a pilot. BrightEyes is a hi-vis campaign by the RAF Safety Centre to educate and inspire riders to do just that. The Campaign has been running from 2016 and is still going strong and runs in parallel to RAF Shawbury's 'Be Seen Be Safer' Campaign, which has identical aims, but is targeted at a local audience.

Since I have been going to Agricultural & Horse Shows with the British Horse Society in 2017, informing the riding community on the importance of wearing hi-viz I have noticed there has been a drop in complaints to the low flying cell. Of course, not all complaints are valid but, in 2017 there were 353, 2018 saw 221 and in 2019 it dropped again to 183. I believe this is due to the RAF's proactive approach to the issue, educating people on the utility of hi-visibility in the countryside. It has been quite eye-opening how many people have not considered using the hi-viz until I show them a picture taken from a helicopter of the difference a pilot sees from above when using, and not using hi-viz.

As part of the education campaign, we give out a wide range of hi-visibility items to hopefully get riders to lead by ample and spread the message. Hatbands, tabards, quarter sheets and fly masks for the horse's ears can all be made hi-visibility to aid visual detection.

As a bonus, these items are also very good for road use. When out riding on roads using hi-visibility and reflective materials will also help drivers in being able to spot the horse and rider. Especially if they are riding in areas where the roads are covered in trees or at dusk. They can also help if someone has an accident and if a helicopter ambulance is needed it also makes it easier for them to be spotted.

I have been to many horse events by kind invitation from the British Horse Society all over the United Kingdom & Northern Ireland. It is here that I get to speak to the public about our campaign and what we are trying to achieve. The majority of people I speak to understand the importance of low-flying but are still very irritated as riders. However, once they have said their bit, I speak to them and show them what it is that the RAF are actually trying to do to help. Mostly, everyone so far has gone away content with the RAF's proactive approach. The Safety Centre is continuing the funded campaign for a further 3 years. Hopefully, now that COVID 19 seems to be on the retreat in the UK, we can start getting out to horse shows again.

Comments by the British Horse Society (Scotland) (edited):
"'Be Seen - Be Safer' and 'BrightEyes' are ongoing RAF campaigns aimed at the horse riding community to promote the wearing of high visibility clothing. From the BHS point of view, it is clear that high-visibility clothing significantly improves the detection range of riders in the open countryside. It is acknowledged that high-visibility clothing may not prevent an overflight, however it does provide a considerable, cost-effective improvement to rider safety and will help military aircraft to avoid over-flying horse riders if they can be identified in sufficient time.

BHS Scotland has had close working relationships with the RAF over the last couple of years and we hope that this continues. This improves rider awareness and increases the understanding that riders and pilots have in promoting any safety issues. It is crucial that riders give pilots every chance to see and avoid them, by wearing Hi Vis clothing all the time.

Over the last few years, the RAF has attended The Royal Highland Show and Blair Castle International Horse Trials, which are the two showcase shows of the year in Scotland for the BHS. The RAF presence within the BHS stand has been very successful in educating riders and non-riders on the importance of hi-viz and why hi-viz should be worn at all times whether riding or in hand and not to be restricted to work on the road but also to riding in the open countryside and on the beach.

The British Horse Society supports this initiative."

Julie Hanna, BHS Regional Manager, Scotland.

RAF Shawbury Wins MOD Sanctuary Award for 'Be Seen Be Safer' Campaign
The Ministry of Defence's (MOD) prestigious Sanctuary Awards took place virtually on 16 March 2021. RAF Shawbury's Be Seen Be Safer horse rider awareness campaign was awarded a highly commended in the Social Value, Community and Heritage Award category. The MOD's Sanctuary Awards are organised by the Defence Infrastructure Organisation to champion and celebrate the work of our people in Defence-wide projects.

Squadron Leader Kim Leach, who leads the campaign, is based at RAF Shawbury which is the home of Number 1 Flying Training School. The School trains helicopter aircrew from all 3-Services in preparation for operating on front-line helicopters. Flying training takes place in Low Flying Area 9, which covers all of Shropshire and the borders of adjacent counties. As well as being ideal for flying training, this area is also highly populated with equine businesses and horse riders.

Squadron Leader Leach said: *"With over 130 flights a day, our aircrew do sometimes encounter riders. When I was first posted to RAF Shawbury, I was surprised by the number of complaints from horse riders. My research revealed that many riders were unaware of the safety benefits of wearing high-visibility kit and, that our aircrew had difficulty in spotting riders if they were not wearing it."*

This research led to the launch of the Be Seen Be Safer campaign which in addition to building relationships with the riding community also had these three aims:

- to reduce the number of low flying complaints from within Low Flying Area 9
- to increase the number of members of the equestrian community wearing high visibility clothing and equipment
- to ensure all RAF Shawbury based aircrew were trained in measures to avoid equestrian disturbance when low flying.

To achieve this, Squadron Leader Leach worked closely with The British Horse Society and the aircrew at RAF Shawbury to trial different items of high visibility kit. Funding was approved to purchase high visibility kit to distribute to Pony Clubs and local riding groups. In addition, educational events were held such as Rider Awareness Days; local riding groups were invited to the base to meet the aircrew, get airborne and experience the challenges that aircrew face in identifying riders without high visibility kit.

The Station Commander of RAF Shawbury, Group Captain Phil Wadlow said: *"Feedback and evaluation of this campaign has proven its success. RAF Shawbury continues to work with the RAF's Air Safety Centre and The British Horse Society. We are delighted that our campaign has been shared with other units to ensure that our safety message is spreading throughout the country to create a safer environment for all."*

Sqn Ldr Kim Leach, RAF Shawbury: Crown Copyright © 2021

Alan Hiscox, Director of Safety at The British Horse Society said *"We are very pleased to have been working with RAF Shawbury for several years so that riders can understand the efforts that RAF pilots make to avoid flying over them. The wearing of high visibility clothing makes such a difference and increases the safety of every horse and rider. It is fantastic to see the success of Be Seen Be Safer campaign being recognised with this award and we look forward to continuing this partnership with RAF Shawbury".* ■

Noteworthy **DASORS**

By RAF Safety Centre

Safety Disarm Unit Pin left in after Refuelling (Wildcat)

Narrative Description of Event: This is a third age report focusing on my Failure to Follow Procedure for conducting full checks post a refuel – the outcome was the aircraft lifted with a Safety Disarm Unit (SDU) pin still attached to the outside of the aircraft.

Event: Following a second refuel at Heliops Portland, Marine 12 departed via the Hardened Aircraft Landing Strip (HALS) enroute Yeovilton for an IF Recovery. Approximately 1 minute after lift "Heliops Zero" contacted Marine 12 to enquire about a tally seen on the starboard side of the aircraft as we departed. The realisation in the aircraft was that we had left the SDU Pin still in place on the starboard side of the aircraft. Marine 12 recovered to the HALS, removed the pin and the aircraft was recovered to Yeovilton without further incident.

Background: As it was half-term my children were in keyworker childcare and so I was constrained by a hard-pick up time of 15:30. Originally the sortie time was planned 10:45 to 14:00 to allow plenty of time for aircraft recovery, debrief and transit from Yeovilton to the childcare. However, the requirement to conduct a Partial Test Flight (PTF) to generate a spare for a VIP Transfer took priority. It was discussed between Ops and myself whether my two 'students' could conduct a PTF 1045 to 1130 and make a 1245 to 1445 helicasting sortie. I discussed that it would be tight for timings but we agreed. In the morning we briefed the execution of helicasting at 0900, the crew briefed separately for their PTF on completion at around 0930. The PTF aircraft was unfortunately then unserviceable on start (with a proposed delay by the engineers to launch later). We (Ops, myself, the Instructor) debated whether the generation of a VIP Transfer spare was the priority or conducting helicasting. Ops discussed with HQ via TELCON and the decision was to continue with helicasting.

The helicasting crew then conducted a MATE sortie brief; however, on starting the aircraft a loose communications cable was discovered, along with a panel in the cabin which had be become unsecure internally. A spare comms lead was sourced and the panel secured before launch but the lift time was now 1245. On arrival at Heliops the troops were successfully embarked and serial one conducted without incident by 1330. At approximately 1345 a Rotors Running Refuel & Crew Change was conducted without incident and serial two was completed. On arrival at Heliops at around 1430, for the final pax drop at and refuel prior to transit home, I began to place undue pressure on the crew – the time was late and we still had a refuel and transit home to complete. In my mind I had to get back, sign the aircraft in and travel to childcare and collect my children.

I did not effectively monitor the crew who conducted abbreviated take-off checks, at my request – I was clearly rushing everyone. Fortunately, Heliops' diligent staff saw our mistake and we were able to recover to the HALS shortly after departure before any damage was done the aircraft. We lifted from Heliops again at around 1445, recovered to Yeovilton at 1505. I was able to sign the aircraft in and depart by 1515 with a promise to conduct the debrief remotely the following day. It was only whilst completing the STARS remotely at home, and a prompt by the duty auth that I stopped to consider the whole scenario.

On reflection I was trying to achieve too much versus a backdrop of self-induced pressure. I could have halted the sortie the day before when Squadron priorities began causing friction against my availability; I could have called a stop when unforeseen aircraft unserviceabilities caused further delays to launch. I could have curtailed the second serial or halted earlier. Finally, I should have done what I briefed others countless times before – "conduct a full set of pre-take offs if you've taken fuel". In the end we saved no time – we had to fly a circuit and recover to HeliOps which took far longer than the extra 30 seconds a full set takes.

Outcome: It was a clear F2FP by me, and rule violation for personal gain. I can't misconstrue this as rule violation for organisational gain as no-one stood to benefit but me. ■

Poor Decision Process Post Alternator 1 Failure (Puma)

Narrative Description of Event: This DASOR is being raised to highlight a poor decision, made during a minor emergency and how others can learn from it in the future.

Event: I was the captain QHI of an OCU CTR (Operational Conversion Unit Conversion to Role) formation sortie operating from the RHS as lead with a student pilot in the LHS. Approximately 10 minutes out from Chepstow barracks to the North of Bristol the Alternator 1 failed. The actions were conducted iaw the FRCs. The Alternator 1 light remained, and the No.2 aircraft was informed. The FRCs stipulated that this is a 'land as soon as practicable'.

This is defined as: "Land at the nearest aviation location or, if one is not reasonably close, at a safe landing site selected for subsequent convenience."

As Captain, I discussed with the crew and informed the No.2 aircraft but at this point elected to return to RAF Benson. The transit back was uneventful, and the aircraft signed back to the engineers.

Outcome: This was a poor decision. I am not sure what persuaded me to return to Benson however, the correct course of action would have been to divert to either Bristol or Gloucester and shutdown iaw with the FRCs and seek engineering advice. Although the transit was uneventful the weather was poor approaching Benson and, had we gone 'inadvertent', this would have made the situation more serious with only one serviceable Alternator.

I raise the DASOR as it served as a reminder to me not be complacent with minor emergencies and remember what could occur in the worst instance and to follow the FRCs urgency of the need to land. I don't fully know why I came to this conclusion - whether it was complacency, an urge to get the aircraft home or from my previous experiences. I hope it also serves as a reminder that no matter how junior you are within the crew it is perfectly acceptable to question a decision that is made by the captain, if they feel that it is the incorrect one. This is particularly pertinent in the training environment when often a steep cockpit gradient exists. In this incident the rest of the crew were content with the decision however, I believe had any concerns been raised from my student crew or even the other aircraft, it would have been enough for me to re-consider my course of action. ■

Spry's Comment:

These narratives speak for themselves.
There are clear lessons for aircrew, especially Captains in these tales. Normally, I would expect to see these kinds of stories sent to me years after the event in an 'I Learned About Flying From That' article for this magazine. The fact that these 2 officers were happy to share their transgressions with their aircrew colleagues and the Air Clues audience is testament to their own professionalism and a credit to our open and honest reporting culture. ■

I Learnt about Flying from that Flat Cockpit Experience Gradient

By Flt Lt Phil Mobbs RAF (Retd)

Many years ago I had completed a tour as a QFI on a University Air Squadron and was posted to the Central Flying School to train new instructors on the Bulldog. Having become an instructor at the end of my co-pilot's tour on the C130, I was relatively inexperienced in total hours compared to some of the old & bold QFIs that constituted the majority of the staff of CFS, many of whom were Specialist Aircrew Sqn Ldrs. At that stage of my career I was still considered to have a bright future ahead of me and as none of them were interested in doing the job I was also the Main Course Flight Commander and Deputy Squadron OC. There was also a separate Refresher Flight for those returning to instructing from other jobs, run by a Spec Aircrew Sqn Ldr.

I was also a squadron Instrument rating examiner (IRE). There were IREs on Refresher Flight but, as a general rule, their QFIs liked to complete their sorties before lunchtime allowing them to be on the golf course by the early afternoon so, as well as IRTs for all the main course students and staff, I would sometimes pickup those for the Refresher students.

The standard IRT was straightforward – fly to a nearby airfield (in a Bulldog the airfield had to be nearby) to conduct the first instrument approach, climb up for the 'unusual position' (UP) recoveries, both full panel and limited panel (without the aid of the artificial horizon) before recovering to base for a limited panel approach. All of the IREs I had ever flown with would commence the limited panel work by announcing that the artificial horizon had failed and then covering it up which I considered rather too gentlemanly and I felt unrealistic, as if we ever had to do one for real we were unlikely to know about it beforehand. So, I had developed my own method that when the student had demonstrated their ability to recover with full panel I would then deliberately topple the artificial horizon. Having set them up in the next UP when they recovered the aircraft to 'straight & level' on the now erroneous instrument, the performance instruments would show them not to be and they would then have to revert to limited panel, using the turn & slip indicator to establish wings level whilst pitching to stop the altimeter from moving. Throughout this procedure they would have to ignore the artificial horizon which was giving them a very strong but incorrect visual cue. I felt that this was a much more effective way to test a candidate's ability to recover the aircraft from an inadvertent UP. Having diagnosed the main instrument failure and recovered I would then cover it up for the remainder of the limited panel UPs and the recovery to base.

> "I'd completely lost it and was waiting for you to take control!"

On one particular day I was tasked to carry out an IRT (test) for Refresher Flight on a very experienced sqn ldr QFI who was converting to the Bulldog, but who had many thousands of instructional hours on the Jet Provost, amounting to several times my total hours. I had not flown with him previously but with that solid background I anticipated that the sortie would be no problem for him. Refresher Flight certainly gave me no indication of any likely issues. We departed through a solid cloud base to conduct the required instrument approach at a nearby airfield before climbing up above the cloud to complete the necessary upper work. This was the only fun part of the IRT for the IRE as the rest just involved watching the student fly on instruments whilst maintaining a lookout if we were VMC.

I would manoeuvre the aircraft into an unusual position with the student looking down, give him control and he would look up and recover back to straight and level flight. This part of the test went well and I then made the fatal error of instructing - which was to relax and enjoy myself because the student, who as I said, was vastly more experienced than me anyway, was doing ok.

With the full panel recoveries completed to my satisfaction he was ready for the limited panel ones but as I have already stated I wasn't going to let him know this. In order to topple the artificial horizon, all that was required was a pull-up into a vertical roll, stall turn out then, with its gyro no longer aligned to the horizontal, I put the aircraft into a descending turn with around 30° angle-of-bank. I gave the student control and he promptly levelled the wings and put the nose on the horizon using the artificial horizon. But now it was in a 60° opposite turn with a steeper nose attitude and with the speed increasing. At this point he should have transferred his attention to the turn and slip, rolled to put the needle vertical and pitch to stop the altimeter unwinding…. but he didn't. The nose dropped further and the speed increased, 'he's about to recover', I thought, 'he's a very experienced QFI…' Then finally the penny dropped, we were descending rapidly with the speed fast approaching VNE and the cloudtops getting close. I was about to go IMC with an artificial horizon that I'd just toppled, about to be in a real limited panel UP of my own making. I took control, closed the throttle, levelled the wings and pulled hard, narrowly avoiding the cloud. As we climbed away and I found the time to draw breath I asked him why he hadn't recovered or said something, to which he said, 'I'd completely lost it and was waiting for you to take control!' Feeling somewhat chastened I decided that he would benefit more from a re-teach of limited panel recoveries after which we returned to base, leaving the IRT for another day which I made sure Refresher Flight carried out.

What did I learn on that flight? Well, things normally go wrong just after you've relaxed your attention because the student is apparently doing well. Previous experience for any student is no guarantee of current performance, especially if it's on a different aircraft type. I might have thought that my transition to limited panel flight was clever and more realistic, but I should have considered the prevailing conditions when doing it. Had I perhaps been a little less keen to demonstrate my innovative ability despite my relative lack of experience I might have been a bit more flexible and not chosen to deliberately topple the artificial horizon on a day where there was a possibility of going IMC. ■

Helmet Mounted Displays **in Military Aviation**

By Squadron Leader Bonnie Posselt, RAF Exchange Flight Surgeon, Wright-Patterson Air Force Base, USA

Helmets have come a long way since their initial purpose of simply protecting the head. It is now possible to mount optical displays onto a helmet adding capabilities that were simply not possible previously. The earliest recorded military application of a Head Mounted Display (HMD) within a helmet dates back to 1915 with the "Integrated Mounted Aiming and Weapon Delivery System" used for ground-based soldiers, seen in Figure 1. The sighting system mounted onto the helmet allowed a solider to take aim at a target by moving their head alone, leaving their hands free. They could then fire the small gun, also mounted onto the helmet, by pushing a cable down with their tongue.

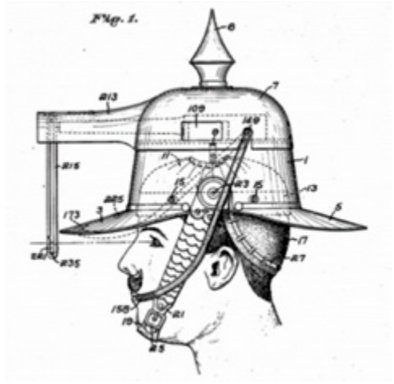
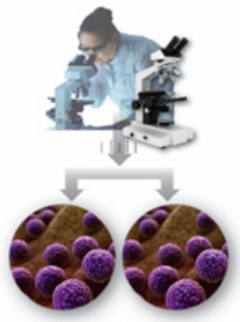


Fig 1. Integrated Mounted Aiming and Weapon Display. Copyright: US Patent and Trademark Office. All rights reserved. Permission to reproduce under US 'Fair Use' policy.

Today, an HMD uses optics and electronics to provide the ability to create a fully immersive 3D virtual environment that can be used for training and is good enough to teach pilots to fly, or simply transport you to another world entirely. In the operational aviation context, HMDs are built into the Helmet itself, becoming a Helmet Mounted Display (also abbreviated to HMD). See-through 'augmented reality' HMDs project digital information over the real world scene, providing pilots with flight information whilst keeping their heads out the window, enabling them to still fly the aircraft visually. A 'heads out viewpoint' can be not just beneficial, but critical, when flying in formation, flying close to the ground, air to air refuelling, or when engaged in battle fighting manoeuvres. In these situations, it could pose a significant flight safety hazard if the pilot were to look back into the cockpit to read their flight instruments or information management systems. When coupled with head tracking, a weapon system can follow wherever the pilot looks, so they can locate a target and cue a weapon onto it without having to change the orientation of the whole aircraft, saving valuable time.

An HMD can be defined by its optical arrangement; monocular, biocular or binocular (Figure 2). In a monocular set up, one optical display provides one image to only one eye. In a biocular display, there are two channels, each providing the same image to each eye.

Monocular: One image to one eye



Biocular: The same image to both eyes

Binocular: Two different images to each eye

Figure 2. Three different orientations of HMDs: monocular, biocular, and binocular. Copyright © 2021: 711th HPW, USAF. All rights reserved.

With a binocular display, there are also two separate optical systems, however, the images presented to each eye are slightly different, and therefore it is the only system able to give a true 3D perception of depth. This approximates how we view the real world with our two eyes, each giving a slightly different perspective of an object.

HMDs can also be classified by how information or imagery is displayed within it. If information stays with the user regardless of where they are looking, then it is termed 'screen-referenced'. An aviation application for screen-referenced information could be simply displaying airspeed, altitude, or fuel status to the pilot and no head tracker is required. In contrast, information can be 'geo-referenced', fixed to real world objects outside the aircraft, identifying moving targets or mapped to terrain. Such a display will require a head tracker to be integrated into the HMD. Of course, a combination of both types of information are often present in many displays.

Current HMDs used in military aviation are illustrated in Figure 3. Initially, HMDs in the 1980s were all monocular, and monocular devices are still used today in the form of the Integrated Helmet and Display Sight System (IHADSS) used in the Apache attack helicopter and the Joint Helmet Mounted Cuing System (JHMCS) used in several fourth-generation fighter jets. One of the most significant downsides to using a monocular system, is its potential to cause binocular rivalry. This occurs when the images viewed by each eye are so different that the user is unable to fuse them together, causing imagery to alternately fade from view/awareness. In addition, such visual discord between eyes can cause discomfort in the form of nausea, eye-strain, and headaches. Another disadvantage is that monocular optical equipment shifts the helmet's center of mass to one side of the head. Such asymmetric imbalance can cause musculoskeletal strain and injury. Over time HMDs have developed and evolved, becoming more complex, with both biocular and binocular designs incorporated across a number of modern aircraft platforms.

The latest generation of HMDs, such as the Collins Helmet Mounted Display System (HMDS) in the Joint Strike Fighter (JSF) and the BAE Striker HMD in Typhoon, operate biocularly, projecting the same image to each eye. Whilst these HMDs currently operate in a biocular fashion, as they have two separate optical systems, they have the ability to display 3D, that is to say binocularly. With a 3D binocular system, information can be 'popped' out towards or away from the pilot, which could improve situation awareness, reduce reaction times to an alert, better facilitate a visual search for information within a cluttered display, or improve spatial awareness in a degraded visual environment. However, the disadvantage to binocular displays is their significantly greater cost and engineering complexity. Both optical systems must be properly aligned to the pilots' eyes to avoid eye-strain and the appearance of double images, and must also be aligned with the head tracker to ensure accurate positioning relative to the real world. With two optical systems, overall mass of the helmet is increased, which would be exacerbated by G forces, however, the mass is evenly distributed.

Arguably one of the most beneficial features of an HMD, is that it vastly improves a pilot's situational awareness (SA), utilising a number of infrared, thermal and visual sensors to create an accurate representation of their environment, even in a degraded visual environment (DVE). Whilst symbology augments the outside visual world, by overlaying symbolic or textual information, in a DVE, the sensor generated image is the virtual scene the pilot views without relying on or paying attention to real world visual cues. HMDs now provide not just desirable additional features, but have evolved to become critical and integrated parts of the aircraft weapon and flight control systems, without which the aircraft cannot be operated.

The Future?

HMDs are here to stay and will be incorporated in a number of different ways to the military aviator. In the future, we are likely to see increasing dependence on advanced visual displays, enabling a greater amount of information to be more efficiently processed by the aviator and improving

Figure 3. Current HMDs – L to R; 1. Integrated Helmet And Sight System (IHADSS) used on Apache, 2. Joint Helmet Mounted Cuing System (JHMCS) used in fourth generation fighter aircraft, 3. Aviator's Night Vision Imaging System (ANVIS) monocular HMD used in a variety of rotary aircraft, 4. JSF HMD, 5. Striker II HMD.
Copyright: Fig 3.1 - https://commons.wikimedia.org/wiki/File:Integrated_Helmet_Display_Sight_System.jpg;
Fig 3.2 - Copyright © 2021: Vision Systems, Inc. Reproduced by kind permission, all rights reserved; Fig 3.3 - Copyright © 2021: Elbit Systems Ltd. Reproduced by kind permission, all rights reserved; Fig 3.4 - Copyright © 2021: Collins Aerospace Ltd. Reproduced by kind permission, all rights reserved; Fig 3.5 - Copyright © 2021: BAE Systems Ltd. Reproduced by kind permission, all rights reserved.

A Royal Air Force Typhoon pilot with 6 Squadron wearing a 'Striker' Integrated Display Helmet during Exercise Bersama Lima 11 in Malaysia.
BAE Systems' Striker helmet-mounted display system (HMDS) is based on the company's unique two-part helmet design. It provides comfort, protection, and helmet stability for fixed- and rotary-wing platforms. The Striker helmet design has also been adopted for use on the Eurofighter Typhoon and Saab Gripen multirole fighter aircrafts.

situational awareness, particularly in degraded visual environment such as flying at night or in poor weather conditions. Almost certainly, more colors will be incorporated into displays, alongside 3D binocular images. Sensors within the Helmet will be able to monitor and track physiological parameters of the pilot; built-in eye trackers could measure pupil size, blink rate, and scan pattern, indicating alertness and fatigue levels. Blood oxygen levels and heart rate could be sensed, as well as sweat concentration and peripheral skin temperature, which when combined could provide a more accurate and objective measure of pilot performance and health status, all useful tools aiding decision-making. HMDs are envisioned to be at the centre of any cockpit management system for future fast jet platforms, such as the BAE Systems Tempest (Figure 4.) Additionally, it is likely HMDs will play an increasing role in training. When linked with realistic audio and tactile cues they are able to create a truly immersive and captivating simulation, all while reducing costs of operating and maintaining aircraft. In addition, a virtual simulation can be operated remotely and linked up with other concurrent simulations hosted by international allies, enabling large-scale exercises. ■

Figure 4.
Illustration of potential future Tempest cockpit with an HMD. Copyright © 2021: BAE Systems Ltd. Reproduced by kind permission. All rights reserved.

Squadron Leader Bonnie Posselt
RAF Exchange Officer – 711th Human performance wing, USAF, Wright-Patterson Air Force Base, Ohio, USA.
PhD Candidate investigating human performance using next generation HMDs and associated vision standards.
Medical Officer specialising in Aviation and Space Medicine.

Principal Reporting Systems

By RAF Safety Centre

ASIMS is an internal tool used for the reporting, management and exploitation of air safety occurrence and investigation information. It is a dynamic system allowing the most up to date information to be recorded as it becomes available. To log into ASIMS, MOD users can navigate to https://www.asims.r.mil.uk/ in your browser.

Defence Air Safety Occurrence Report (DASOR)
Regulatory Article (RA) 1410 directs that a DASOR is to be used to report all air safety related occurrences, be it notification of an event which has already occurred or identification of a potential air safety hazard i.e. a hazard/observation. In addition to the standard DASOR, complementary forms are available for specific specialist occurrences which require further information from the reporter (e.g. airprox and birdstrike reports, among others).

The primary method for submitting a DASOR is through ASIMS. This application is only available on internal MOD networks by navigating to the following URL: https://www.asims.r.mil.uk/ although, in future there should be an option for submitting from a personal device.

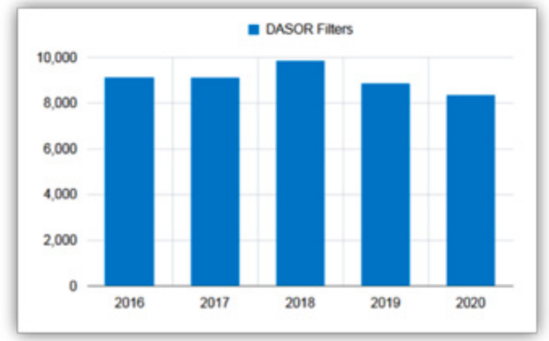


Fig.1 RAF Total DASORs 2016-2020

Occurrence Management and Analysis
ASIMS is a powerful tool. It provides the ability for the individuals who manage and investigate the reports to submit their findings and make recommendations to reduce the likelihood of an event occurring in the future. It also has some useful analysis capabilities mainly focused on providing the user with an ability to investigate trends and review specific themes. As with any reporting system, feedback to the person who submitted the report is a vital step in the process. It not only updates the individual on any investigation outcomes but should encourage future reporting.

Fig.1 shows the number of RAF DASORs for each year since 2016. Despite the COVID-19 restrictions you can see that there were still over 8000 reports in 2020.

The RAF is continually trying to improve its air safety reporting culture. Measuring this is a difficult task. However, one area of focus is trying to encourage people to report hazard/observations i.e. the conditions or things which may contribute to an incident occurring. Fig. 2 shows that over the last 5 years we have continued to increase the proportion of hazard observations. We encourage all personnel to report these hazard observations so that our air safety management system can be proactive. By investigating and managing hazards, we can reduce likelihood of air safety incidents and accidents occurring in the first place.

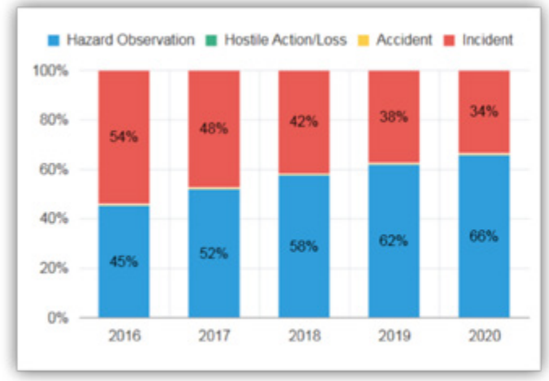


Fig.2 DASOR Types 2016-2020

ASIMS training, reference material and further info
ASIMS users should undertake the appropriate training packages for their role/requirements prior to using the system; however, this is not necessary to submit a report.

ASIMS user training courses are available through ASIMS with further guidance and information available in the ASIMS user manual.

For access to ASIMS, contact your local flight safety point of contact.

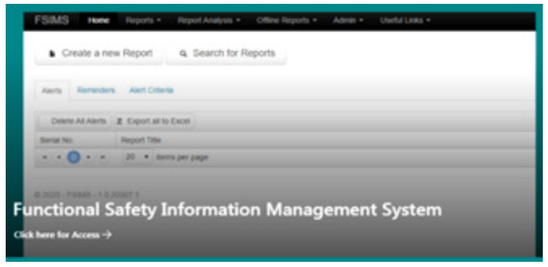
Defence Confidential Occurence Reporting Scheme *(DCORS) Form*

Air Safety matters are generally best addressed through your unit using normal Service channels. However, if you want to make a report without going through your chain of command, and you fear it might go unreported if you were forced to go through your chain of command, then you can make a confidential report using the DCOR scheme.

For RAF Personnel, this will normally go straight to the Inspector of Safety at the RAF Safety Centre and your identity will be protected. The form can be found on the Safety Centre's Comms landing page:

https://modgovuk.sharepoint.com/teams/23116

Functional Safety Information Management System (FSIMS)



FSIMS is the new reporting tool for the RAF, that allow us to report all occurrences for Functional Safety and replaces the very basic a limited system - AIRS (Accident & Investigation Reporting System).

FSIMS provides us far more functionality than its predecessor AIRS and is a very simple tool to use with no formal training required. You will find several training PowerPoint presentations on the Comms page to walk you through the various functions and a User Guide. CESO are also delivering FSIMS demos to all Stations that request one.

FSIMS FSOR Management

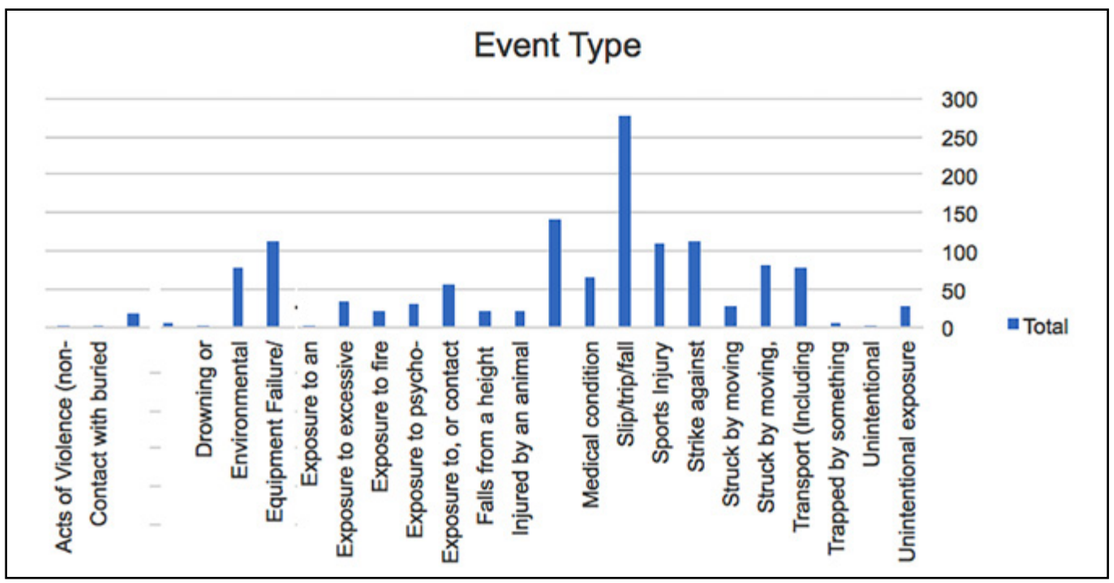
FSIMS Adding Additional Report Details

FSIMS How to search for reports

FSIMS Input Report details into FSIMS

FSIMS Adding Personal Injury Details

FSIMS How to close Ocurrences



Its primary function is to report all functional safety occurrences, such as accidents, near miss incidents, occupational disease, unsafe acts, unsafe conditions and environmental occurrences and more importantly, investigate and learn from these occurrences. The tool will allow us to conduct our investigations and upload all the gathered evidence (up to Official Sensitive Personal) in one place and it is secure. All information is to be recorded in the appropriate sections, guidance on this can be found in the FSIMS User Guide and JSP 440 Lflt 9.

The system also provides us the opportunity to conduct a trend analysis across the entire AIR TLB and there are ample search fields that can be used to conduct the analysis. When conducting your search and trend analysis, FSIMS also provides the opportunity to download the information on to an Excel Spreadsheet and from there pivot tables, graphs etc. can be created.

There are several different FSIMS accounts that can be requested depending on the job role of the individual but with Guest User anyone can access FSIMS and report an occurrence without the need to request an account.

If your job role is to provide statistics and tables then Report Reviewer is the account for you, if you are a line manager who is responsible for the management of occurrences then you would need the Commentator access. Accounts can be requested using the Account Creation form link on the FSIMS Comms page.

If you have not yet applied for an account, I would encourage you to do so by submitting the account request form via the FSIMS Comms page. Once received one of the team will then create your account and email confirmation that it has been completed. On the Comms page you will also find the SyOps Agreement, this must be read prior to using FSIMS. There is also a Team Site that you can sign up to so that the FSIMS community can talk to one another, share good practice and report any issues etc.

https://modgovuk.sharepoint.com/teams/23116/SitePages/Functional-Safety-Information-Management-System-(FSIMS).aspx

HQ Air Performance and Risk Management

Performance and Risk Management Information System (PARMIS)

PARMIS is Air's new Information System for the reporting of performance against Defence tasks and RAF strategic objectives, and for the management of risk to output. It replaces SAPPHIRE and meets the requirement for quarterly reporting to the RAF Senior Leadership Team and upwards into MOD. Adapted from commercial off-the-shelf software, PARMIS allows for reporting at all levels of the organization to be combined into a single recognized management information picture covering the entire RAF, at both OFFICIAL and SECRET classifications.

Whilst the system can be updated at any time, the data is formally reviewed at the end of every Quarter. As a result, and unlike the examples of ASIMS and FSIMS above, PARMIS is not intended for use to report specific incidents; issues that are time-sensitive should be communicated using the chain of command. Where PARMIS is valuable, however, is in recording and managing the impact following an Air or Functional Safety incident and in managing the associated activity that follows from it.

Enterprise Risk Management (ERM)

Alongside the performance reporting element of PARMIS, the RAF is moving towards the implementation of 'Enterprise Risk Management' (ERM). ERM will combine the management of all risks associated with the delivery of RAF activity using a single system (i.e. within PARMIS), to allow for better decision making through better understanding of the interdependencies between different risks, controls and outputs.

The main focus of ERM to date has been the management of risks to output. It is fully recognized that Safety risks (i.e. those where there is a clear Risk to Life) require a subtly different approach due to, amongst other things, the unique regulations for risk ownership, limitations on risk delegation/transfer, and legislative requirements relating to ensuring risks are As Low As Reasonably Practicable (ALARP) and Tolerable. Work is underway by the RAF Safety Centre and Performance Management teams in order to address these, with the aspiration remaining to move all Safety Risks to PARMIS in due course. The expectation is that Functional Safety risk management will be the first element to transfer, and further guidance will be issued when it becomes available.

PARMIS Access. All those who are likely to need PARMIS access as part of their role should already have been engaged and undertaken the training required for the granting of an account. If, however, you believe you will need to use the system in the future please contact your local business manager, a fellow PARMIS user or the AIR Performance Management team via their sharepoint or Teams site below. ■

https://modgovuk.sharepoint.com/teams/23469

Carrier Strike Group 21- Joint Threat Emitters

By Sqn Ldr Rod Clark, A7 Enablers

As part of HMS Queen Elizabeth's (QNLZ) operational workup, CSG21 Group Exercise recently took place off the coast of Scotland in the North Sea. QNLZ was joined by a multi-national force of maritime assets along with air assets from the RAF and the USMC. The air assets consisted of embarked F35 Lightning aircraft from 617 (The Dambusters) Sqn and VFXXX from the US Marine Corps.

To provide a realistic and credible ground-based threat, assets from Spadeadam were deployed to locations throughout the UK and were supplemented by Joint Threat Emitters (JTE) from the 266th Range Squadron (RANS) flown in from the USA, along with the United States Air Force personnel to operate them. The JTEs simulate both single- and double-digit Surface-to-Air Missile and Anti-Aircraft Artillery radar systems. Each JTE can simulate up to six threat systems and multiple JTEs can be linked together. This was the first time these highly capable pieces of equipment and their operators had been deployed to the UK in support of this high-profile defence exercise.

The 266th RANS is an Air National Guard (ANG) unit located at Mountain Home Air Force Base (MHAFB), Idaho. It is composed of more than 135 ANG personnel and is responsible for providing superior electronic simulations of ground-based air defence threats on the Mountain Home Range Complex (MHRC) and beyond.

The 266th provides world-class threat emitter training and air battle management for US and coalition warfighters, to include 5th generation platforms. Relying on ingenuity and constant customer contact, the 266 RANS has employed real world tactics beyond traditional electronic threats to deliver a top-notch service. The 266th RANS deploys globally to bring electronic threats to the warfighter.

11 Group A7 Training Enablers engaged with Northrop Grumman (NG) and the 266th RANS to conduct a trial to prove that RAF C-17 could safely deliver the JTEs from MHAFB to RAF Brize Norton. This was completed in July 20 and the countdown had begun to deploy 2 JTEs and their operators.

The first C-17 arrived at RAF Brize Norton late in the evening of 12 Sep 20 and was off-loaded safely a few hours later. For many at RAF Brize Norton this was the first time they had seen the JTEs and a combined force of RAF Movements personnel worked closely with the Load Masters and the four 266th RANS crew who had flown with the equipment to complete the offload.

Due to COVID 19 restrictions the 266th personnel were required to isolate for 14 days on arrival into the UK. They had been tested negative for Coronavirus prior to travel on the C-17 to ensure they were fit to travel and interact with the RAF crews. A second C-17 arrived with the remaining JTE and another 4 personnel 3 days later.

Following their isolation, the team collected their equipment and set off for the long drive from RAF Brize Norton to Tain Air Weapons Range. Once there, the 266th set about setting up and testing their equipment in readiness for the first engagement of CSG21.

The JTEs are capable of simulating surface to air threats against the air platforms and have proved very capable throughout the exercise. The ease with which the seasoned operators disassemble the equipment, attach to a tractor unit and then deploy and set up at a new location proved invaluable when changes were required to the exercise area. This flexibility also helped when other equipment was unavailable at short notice and the JTEs were able to plug gaps in capability.

Whilst capable of autonomous operation in the field, during CSG21, the JTEs were able to be electronically queued on to their targets from information received by other means. This allowed the JTEs to target 5th generation platforms without the need to highlight their own position. Throughout their participation in CSG21, the 266th operators were in constant communication with a White Force Exercise Control Team (EXCON) who were able to task the JTEs quickly and efficiently, thereby increasing the operational effect against the air vehicles; this increased flexibility and reactiveness meant that 5th generation platforms were confronted with threats they had to honour and react to accordingly.

JTE in the field: Photo by Sqn Ldr Clark

Feedback from EXCON was very positive with all players remarking that the JTEs were a potent threat and added another level of realism to a high tempo exercise. A7 has already fed back the positive responses to the 266th chain of command and requested their support for the next phase of CSG21 in 2021. Overall, the planning, tasking and training opportunities brought to CSG21 by the JTEs was a resounding success.

Following on from the successful deployment described above, a JTE from the 266th RANS was deployed to support Ex STRIKE WARRIOR 21 (SW21). This deployment saw the JTE situated in the far North West of Scotland supporting Spadeadam and USAFE Polygone EW systems. The JTE has been successfully operating in Scotland proving more than capable of dealing with the difficult weather conditions out there. ■

Wire Strike

By Flight Lieutenant Ryan Stone

"Visual with the IP, coming left, looking for wires in 3km".
Then in a split second I am faced with what I can only imagine is a set of strung cables and I am powerless to take avoiding action. The cockpit shatters, *"We've hit wires, climbing, is everyone O.K?"*

On the 28th of July 2020, my crew and I were conducting a normal training sortie through West Wales; completely unremarkable until we made a forced landing following a wirestrike. We had planned to use a mast as our IP, maintaining our transit height of 150 feet until we crossed a set of large power cables where we would then descend and conduct a concealed approach and departure serial; we didn't get that far. It turns out that the mast we had planned to use was in fact a set of strung wires, which incidentally were marked as domestic cables on our 1:50 000 map. The marking was also obscured on the 1:250K chart, routinely used for navigation on the Chinook Force, and no one would have expected to hit domestic cables at 150 feet.

Both I and the No 2 crewman saw the cables with less than a second to impact; I had no time to react. The cockpit windscreens completely shattered but never did I feel like my view was diminished. With the crew all ok and our Chinook seemingly untouched we made a landing in a nearby field to begin the post incident and recovery action. Standing in front of the nose is where the severity of the strike became real; naturally there was some shock and emotions. Eventually we were recovered by our Squadron mates and brought back home, thankful to come away with our lives.

So, what's to be learnt from this "experience"? There are the functional, immediate lessons to reduce the likelihood of this happening again. Then there's the learning as an aviator, authoriser and supervisor following such an event. And finally, the importance of how our family and friends, our Squadron buddies and our leaders and commanders immediately supported us to get us back to flying and being O.K. with what happened.

Firstly, map markings. Yes, they were not clear, could be easily missed and changes have already been made to draw more attention to the hazard of strung wires on charts. We have introduced processes that maximise digital obstruction data into our primary planning system; still, these wires were marked. Use all the resources at your disposal and pay particular attention, aviators and supervisors, to obstructions and flying serials that will, quite literally, ruin your day. Bear in mind that simply coming off track by a few miles, due to weather or other circumstances, could lead you down

Fig. 2 Showing the flight path (red line) and the impact point with domestics on 1:50 000 map.

Fig 1. Showing strung wires marking obscured on the 1:250K (left) and clearer marking on the 1:500K (right). The 1:500K is not normally referred to for Flight Planning by the Chinook Force.

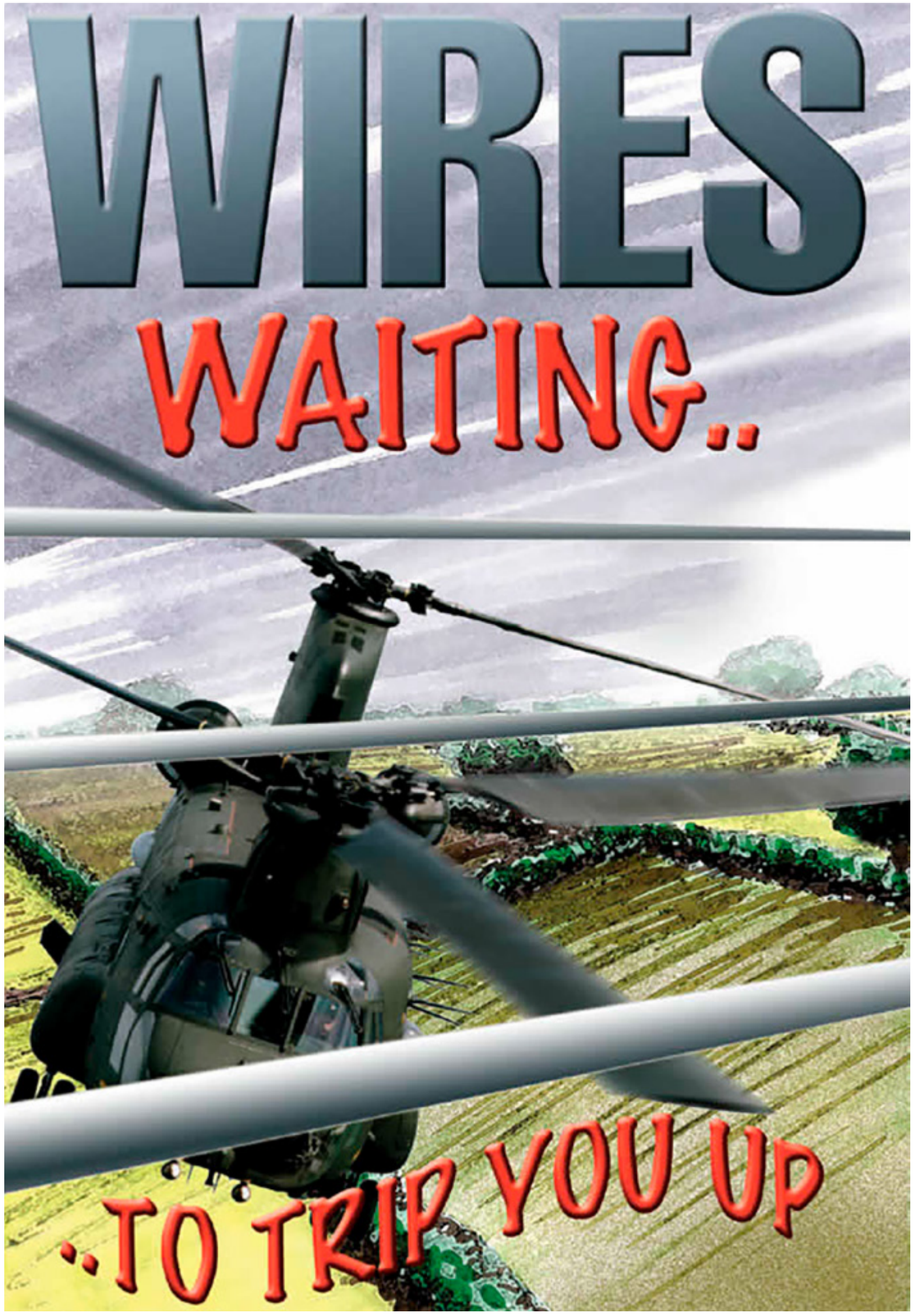
a similarly shallow valley posing the same danger, so check and re-check your routing.

Significant events such as this have a profound effect on your mind; there's no gain to dwelling on what could have happened had things been worse. What is important is to build on the experience to make you a better aviator. I can commend the TRiM, Trauma Risk Management, process whole heartedly to anyone, even if you don't think you need it. Once over the initial emotions surrounding the incident your mind will inevitably turn to the subsequent investigation. Trust that investigators are there to find out what happened and try to prevent it happening again. It will be an uncomfortable time, but it does get better. Be honest with yourself and talk about it; try to embrace the funny side of any jokes if you can.

What shouldn't be underestimated is the support to people following such events. Be this consolation from friends and family; your Squadron Boss and comrades wrapping their arms around you and nurturing you swiftly back into the aircraft to having the confidence that the entire command chain has got your back. It's one of the biggest lessons, not just for myself but one I would implore to any commander or person who knows someone dealing with something like this. Thank you to everyone who was there to help.

Ultimately, I don't think we as aviators are especially gifted; we are a product of our experience and training. Be confident in the fact that when the time comes, your training will kick in and you will deal with the situation unfolding before you to the best of your ability. As helicopter aircrew we have probably normalised the danger around wires and obstructions just by having flown over or near to thousands if not more in a career. What's more we are fortunate that our Air Safety system is so good these days that deaths, serious near misses and injuries are a rarity. A biproduct of this increased level of safety is an unconscious notion of invincibility; "it will never happen to me". We were lucky that day; we had a great crew; an amazing helicopter and our circumstances meant this incident was completely survivable. Others haven't been so lucky, especially when the words helicopter, and wire come together. The old saying 'you start your flying career with an empty bag of experience and full bag of luck' couldn't be more apt. ■

Fig 3. Inside the cockpit showing glass debris and state of windscreens.



Doc's Corner:

Sky High and Dry:

The Risks of Dehydration in Aviation

By Wg Cdr Jemma Austin, Medical Officer, CAS Research Fellow

As we now hopefully get to bask in the summer months of the UK, there is no better time to consider the risks from being dehydrated whilst flying, a physical state which can have serious consequences in the airborne environment.

Promoting fluid intake has been on the military agenda since the 1800s and remains in the spotlight as a key factor in preventing heat illness and maximizing human performance. Proper hydration is essential for sustaining human life and supporting effective functioning.
High workload, heavy sweating, exposure to hot and humid environments, illnesses (like diarrhoea or vomiting) can all lead to us losing more fluid than we have consumed.
The resultant dehydration can be marked by fatigue and a deterioration of mental and physical performance.

Highway to the Danger Zone….
There is growing evidence of a relationship between flight performance and your hydration status. In a study undertaken within a flight simulator environment, pilots' flight performance and spatial cognition scores were poorer when they were dehydrated. Their cognitive impairment extended to psychomotor skills and perceptive discrimination. Simply put, pilots made significantly fewer flight errors when properly hydrated.

Not only do the implications of dehydration get serious in the airborne environment with regards to flight safety and flight performance; the aeromedical challenges of being dehydrated include increased susceptibility to decompression sickness and reduced tolerance to Gz forces, further emphasising the need to maintain hydration whilst flying.

Water is an essential tool to support aircrew performance.

The heat is on….
We're constantly losing water through sweat, urination and breathing. The hotter you get, the more you need to sweat to enable that heat to be lost through evaporation and the more fluid you lose. The airborne environment packs in additional challenges to this:

- **Multiple heat sources.** Radiant heat through the airframe and from the tarmac, heat stress within the airframe and heat generated by flight systems can all add to the feeling of working in an oven.
- **Heavy physical workloads.** Physical activity increases the amount of heat generated by the body.
- **Thermally restrictive AEA.** Inhibits shedding of the heat generated by the body.

Environmental extremes within our operating locations, especially high humidity, can reduce our ability to sweat – our primary method of cooling. If we can't keep the body temperature within its 'happy range' we risk heat illness.
In the past, the wider UK military has not always applied heat illness prevention strategies effectively, resulting in illness, injury and tragically death. Adequate hydration is a cornerstone of these strategies. JSP375 makes it very clear that is every commander's responsibility that their personnel are adequately hydrated for the activity in which they are taking part. Drinking should be encouraged before, during and after a high-risk activity: many flying sorties should be considered within this scope.

Keeping cool in the build-up to your sortie, avoiding heavy exercise or sunbathing will minimise your thermal load. Simple measures like taking air conditioned transport (when available) out to the aircraft, sharing the walkround activity and using sun shelters and shades to keep the aircraft under cover will all help until you can get air in the cabin flowing.

High and dry…
The body provides us with warning signs and symptoms that we are becoming dehydrated.

	**General symptoms:** • Thirst • Headache • Lethargy • Feeling 'out of sorts' • Poor concentration, short term memory and low mood
	**Mouth:** • Dryness of tongue and mucosa • Tongue coating • Decreased or 'ropey' saliva • Dry or cracked lips
	**Cardiovascular System:** • Raised heart rate • Feeling dizzy when you stand (orthostatic hypotension)
	**Skin:** • Dryness • Reduced sweating (armpits and palms) • Decreased 'spring' in skin (turgor)
	**Urine:** • Low volume • Darker colour • Cloudiness

Fig 1: Signs and Symptoms of Dehydration. (Adapted from DRIE Study):

Unfortunately, the mechanism of thirst is not reliably activated so you may already be dehydrated to a level where physical and cognitive issues could present. It can also get switched off a little too readily meaning you stop drinking before you have fully replaced what was missing. Avoidance of dehydration is definitely better than a cure.

How do you solve a problem like urea?....
Guidance suggesting how much we should drink is readily available, from JSP 375 to sports and fitness magazines. The truth is, no individual's fluid requirement is the same as anothers and there is large day to day variation within individuals. Personal health, diet (water containing foods), high caffeine and alcohol consumption, exercise, heat, humidity all play an inter-related part.

If we all got fly round with mini-coolers containing your favourite drink at the perfect temperature (you know the one that just makes you just go 'ahhh!' after the first sips), it would encourage you to drink enough to stay ahead of the problem. But, if access is more restricted, you just have to keep drinking what you can regularly throughout the day.

> "Alcohol is a diuretic, which means it may cause the kidney to release more fluid than you took in, so you could end up still dehydrated and probably with a worse headache the next day!"

If you were imagining a nice cold can of energy drink or even a beer as your post-flight recovery just then, some words of caution. Alcohol is a diuretic, which means it may cause the kidney to release more fluid than you took in, so you could end up still dehydrated and probably with a worse headache the next day! Data from our American aircrew colleagues suggests that caffeine is a mainstay within an aircrew 'diet' to support alertness (consumption averaging over 350mg daily across the pond). Consumption at this level may have a mild diuretic effect (about 100ml additional loss) and is unlikely to have an adverse effect on your fluid balance. However, caffeine at these doses can increase your urge to urinate and at lower bladder volumes.

WBGT (expressed in °C)	Maximum recommended fluid intake, in litres per hour (l/hr), for different WBGTs and work rates (see Annex C)			
	Easy Work	Moderate Work	Hard Work	Very Hard Work
20°C to 24.9°C	0.25	0.5	0.75	1.0
25°C to 26.9°C	0.5	0.75	1.0	1.25
27°C to 29.9°C	0.5	1.0	1.25	1.25
30°C to 33.9°C	0.75	1.0	1.25	1.25
34°C or more	1.0	1.25	1.25	1.25
Note: a standard issued military water bottle holds one litre				

An additional word of caution: drinking too much plain water can have severe medical consequences, as not replacing electrolytes can lead to low level of salts in the blood (hyponatraemia) which can prove fatal in extreme cases. A normal diet should replace salt loss from sweating in typical conditions but in extreme activity the salt loss may not be easily replaced by diet alone, so electrolyte drinks and oral rehydration salts (ORS) are recommended in military guidance if you are unable to adequately eat (see JSP375 Vol 1 Chapter 41, Annex F).

What goes in, does come out, which can be unfortunate for those without easy access to a toilet. The kidneys filter approximately 180L/day of water in men and 150L/day in women. Thankfully 99% is returned to the circulation but that 1% remaining becomes urine that every human eliminates. The urge to release the urine comes before maximum bladder capacity (400-600ml) has been reached so chances are, if you are keeping an appropriate fluid level and your sortie duration is over 2 hours you will need to urinate during your flying duties.

Kidneys like to keep making urine and get upset when the supply dwindles or stops altogether. The urine colour is used as a warning card to its owner, the darker the colour the less water the kidneys have been able to dilute the waste products with; clearly indicating you are dehydrated. Checking your urine colour is one of the best ways to understand your hydration status: '1,2,3, = healthy wee; Over 4 drink more'.

We are frequently deployed to demanding conditions and climates where adequate hydration is essential. However, unlike our colleagues on the ground, managing the call of nature that follows the necessary fluid intake may add a potentially challenging dynamic to staying hydrated whilst flying.

Too pee or not to pee?.....
Urination is typically a private activity in the ground environment. Airborne facilities within UK military aviation can vary from plush toilets fit for a Queen (quite literally) to a chemical toilet suspended above the cabin of a C-130 through to a funnel in the side wall of a helicopter. Those confined to the cockpit have various devices at their disposal to support urination, but they may not always be acceptable (or potentially useable) by all aviators.

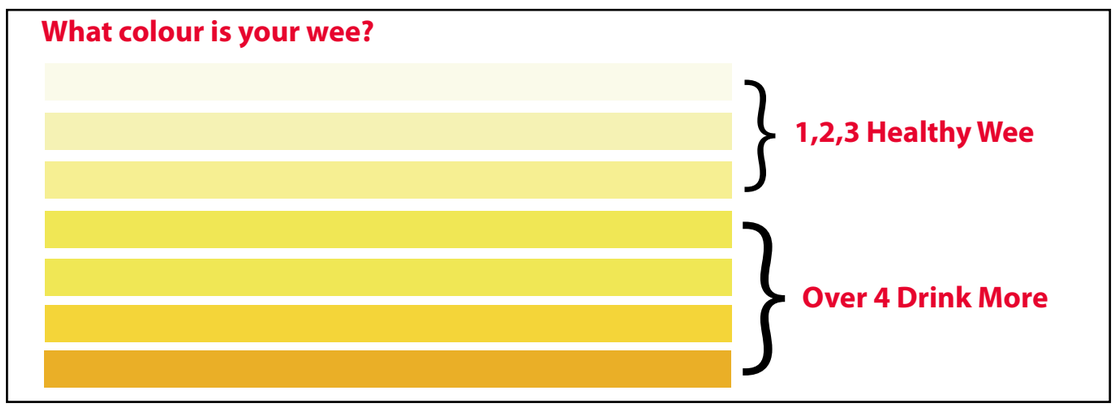
To provide better aerospace medicine support to hydration in aviation, we want to learn more about how crew adapt between the land/sea and air environment to manage urination. A research collaboration (between the Centre for Human and Applied Physiology at King's College London, the RAF Centre of Aviation Medicine and the RAF Centre for Air and Space Power Studies) has been given favourable opinion by the MOD Research Ethics Committee (2047/MODREC/21) to explore hydration and urination (and menstruation) whilst airborne and what effect this may be having on your personal health and wellbeing.

We'd like to hear your anonymous views.
The research will be conducted through an online anonymous survey, completed at a time and place convenient to you. We don't just want to hear from those who may find it challenging – broad views from across the UK military fleet will help form a more complete understanding of what the challenges may be and what solutions are already working. We would like to encourage all aircrew and mission support crew to complete the survey when it is circulated.

With your help we will be able to potentially improve training, design and industry support to hydration and urination in aviation where it is needed and specific to UK military needs. ■

SCAN ME

https://surveys.mod.uk/index.php/813778?lang=en



Airprox Highlights

With Comments from Wg Cdr Spry

16 Jul 20
Typhoon vs C182 (Radar Trail Departure)
Airprox No 2020069

The Typhoon Pilot reported conducting a radar trail departure as number 4 of a 4-ship formation. The formation was initially cleared [RW25] Military Instrument Departure (MID) North climbing to FL150. Prior to take-off clearance from Tower, the departure clearance was revised to: "stop climb at FL040" which was acknowledged by the formation leader before switching to the Departures frequency. The formation departed using standard 20s spacing between aircraft and under a Traffic Service. Before the formation leader had turned north on the MID, Departures called: "traffic north 10 miles tracking south indicating FL60" shortly followed by: "further traffic north 8 miles tracking south indicating FL38". An update was passed 30s later as: "previously called traffic north 5 miles tracking south indicating similar level". At this point the leader achieved radar contact and, perceiving a confliction if the MID was continued, altered heading to 350°, later refined to 340°, and the formation maintained standard radar trail. The traffic passed down the right-hand side of formation members 1, 2 and 3. At 0859:15Z Coningsby Departures called: "[No4 C/S] traffic north 3 miles tracking south indicating similar level." At about this point No4's radar began to build the contact showing it at about 1.5NM. Not being visual, No4 called: "unsighted", whilst levelling at FL040. The pilot then visually acquired the light aircraft, nearly head to head with it, maintaining about a 10° divergent heading and too late to take any avoiding action, and called: "visual". The aircraft passed down the left side and the type, colour and registration were discernible. The pilot noted that the incident occurred shortly after departure, with the main focus being maintaining radar contact with the formation member ahead of him, whilst building traffic SA.

The C182 Pilot reported that he was in transit and was passed on to Coningsby [LARS] from Humberside. It was not busy. He did not ask for a different ATS. Soon after being passed to Coningsby ATC, he was informed of 4 Typhoons climbing and passing him on the right, which they did. He saw the first Typhoon at a range of 5NM and they passed 2-3NM to the right and 100ft above, climbing. No avoiding action was necessary, he could see the 4 Typhoons clearly, they did what ATC said they would do in passing him on the right. He felt comfortable that they could see him.

The Coningsby U/T Controller reported that they were the U/T controller for Departures on Stud 3 at RAF Coningsby, with a screen controller. This was the third session in that seat. At the time of the incident, there were many formations departing and pre-notes from the ground controller. Before [the Typhoon formation] was released, the Radar Approach controller co-ordinated tracks with Cranwell traffic that was general handling northwest of Coningsby by 10NM. It was agreed that the Coningsby tracks would stop climb at FL40 against a Prefect not below 6000ft Barnsley [QNH]. [The Typhoon formation] was then released not above FL40 with Stud 3 on the runway. [At that time] there were no other aircraft within 10NM of Coningsby. After the release, the ATC Supervisor took a handover of a Basic Service LARS track in the vicinity of Wickenby, tracking south. Once [the Typhoon formation] was airborne and identified, the controller called the Prefect traffic to [the Typhoon lead]. Once he had acknowledged this, the controller called further traffic, the Basic Service track. Updated Traffic Information was then passed on the Basic Service track again. [The lead Typhoon pilot] then stated he had system contact and was maintaining heading 340° to deconflict. The screen instructor then instructed the controller to call the traffic to [Typhoon No.4]. At first, he said he was

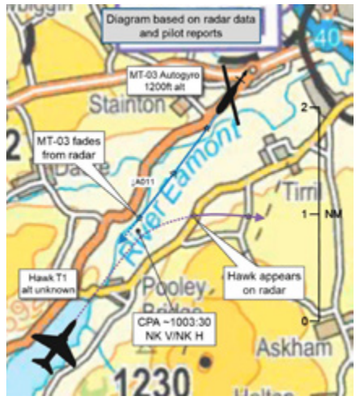
not visual then, two seconds later, stated he was visual.

The Coningsby Screen Controller reported that he was the screen controller for Departures on Stud 3 at RAF Coningsby, with a U/T controller. Numerous formations were departing and being pre-noted. Before [the Typhoon formation] was released, the Radar Approach controller spoke to Cranwell about traffic operating northwest of Coningsby approximately 10NM on the intended route of [the Typhoon] formation and agreed that [the Typhoon formation] would stop climb at FL40 in order to separate from a Prefect operating not below 6000ft Barnsley [QNH]. [The Typhoon formation] was then released not above FL40 with Stud 3 on the runway approved and no other aircraft within 10NM of Coningsby. Prior to [the Typhoon formation] getting airborne the ATC Supervisor took a handover of a Basic Service LARS track in the vicinity of Wickenby, tracking south. As [Typhoon No.1] got airborne, the aircraft was identified, and the coordinated Prefect called. Straight after [Typhoon No.1] confirmed his cleared level and type of service. The Basic Service aircraft was called as north, 8nm tracking south indicating FL38. Traffic Information was then updated as north 5nm tracking south indicating a similar level. [Typhoon No.1] called systems contact and stated he was maintaining a heading of 350° to deconflict. Shortly afterwards, [Typhoon No.1] stated he was coming left to 340° to deconflict from the civilian traffic. At this point the screen controller prompted the U/T controller to call the traffic to [Typhoon No.4] and it was called as north 3NM tracking south, indicating similar level. [Typhoon No.4] said not visual, and then visual in quick succession. The civilian aircraft was visual with the 4 ship of Typhoons throughout. ■

For full details of this Report see AIRPROX REPORT No 2020069 on the Airprox Board Website.

Spry's Comment:

A Radar Trail Departure is an efficient way to get a large formation through cloud and to meet up above in VMC, by reducing communication and time required to get all elements airborne, but it does utilise a large volume of airspace. It is incumbent on both ATC and crews to ensure that the airspace they are going to use is sanitised. The workload for the trailing elements is high, but it is essential to incorporate lookout into their radar trail work-cycle, particularly when operating in class G airspace. □



25 Sep 20
Hawk T1 vs Rotor Sport MT-03 Gyrocopter (Low Level in the Lakes)
Airprox No 2020132

The Hawk T1 Pilot reported being the wingman of a 2-ship Hawk T1 formation. Following the cancellation of a front-line affiliation task, they were re-tasked to conduct a composite training sortie including low-level and air combat. Five minutes into the sortie, their leader had a bird strike and had to return to base. After shadowing them until safe landing, they requested to continue with the sortie as per their authorisation. After a further 10min of low-level, they were exiting Ullswater at approximately 300ft and spotted a yellow gyrocopter directly ahead at less than 1NM. It was co-altitude, travelling in the opposite direction to the flow arrow and they assessed the collision risk as extremely high. They initiated a 4g climbing break to the right to avoid and estimate their subsequent miss distance to be approximately 1000ft during this manoeuvre. There was no immediate reaction from the gyrocopter, but they could clearly see it had two occupants. It continued SW along Ullswater until they lost visual contact.

The MT-03 Autogyro Pilot reported undertaking a pleasure flight. At approximately the mid-point of their journey they encountered a Hawk which appeared to be taking evasive action and passed their left-hand side at approximately the same altitude and disappeared in seconds. The Hawk was in a right-hand bank and climbing when first seen, at a distance of approximately 1km and travelling directly towards them. The relative speeds of the 2 aircraft meant that avoiding action on their part would be ineffective. They were aware that RAF jets used the area for low-level training so were being vigilant. ■

For full details of this Report see AIRPROX REPORT No 2020132 on the Airprox Board Website.

Hawk T1 vs Rotor Sport MT-03 Gyrocopter - Spry's Summary:

This Airprox demonstrates the importance of a proactive lookout scan, as see and avoid remains the critical barrier to mid-air collision when flying low-level. The crew of the Hawk made a timely pick up of the Gyrocopter, enabling them to take swift avoiding action. Valley flying remains a fundamental skill for any platform operating at low-level; this brings increased risk with blind spots, for both look out and a Collision Warning Systems and an inevitable late a tally. Military crews need to be cognisant that a flow arrow will not necessarily protect them from aircraft flying against them, as was the case in this occurrence. General Aviation pilots do not need to adhere to flow arrows; furthermore, they aren't marked on their charts, so may not even know that a flow arrow exists. Therefore, crews should always expect the unexpected, particularly when flying around a blind spot caused by the topography. There is a campaign taking place to help raise awareness of flow arrows by providing flying clubs with a poster depicting the locations marked on them. The key message from this Airprox is lookout and to always expect the unexpected. □

10 Aug 20
Juno vs BE55 (Juno on a PAR)
Airprox No 2020095

The Juno Instructor reported being vectored for a PAR to RW36 when the Shawbury Approach controller alerted them to an aircraft north by 3 miles, tracking south at 300ft below and climbing. The trainee was on instruments and replied to approach controller: "looking". ACAS then reported: "Aircraft 10 o'clock, less than 1 mile." The aircraft in question was initially obscured by the door frame but when sighted it was apparent they were at the same level and their paths would become dangerously close if track was maintained.
The Instructor took control and began a rapid descent, informing Approach of the avoiding action manoeuvre.
The other aircraft tracked above from the 10 to 4 o'clock and did not appear to take any avoiding action. The Instructor noted that Shawbury Approach was extremely busy during this time and, due to the potential dangers of non-Shawbury traffic, Shawbury Zone frequency was monitored as well. At the time the incident took place, the controller was transmitting to another aircraft.

The BE55 Pilot reported that he was in the climb having left the departure airfield. Nothing was reported by the controller and the reporting helicopter was not seen. The BE55 pilot noted that he was using a VHF radio, the Juno was using a UHF radio and that mixing aircraft in the same airspace who cannot hear each other is a problem.

The U/T Shawbury Radar Controller reported that they had had 4 aircraft on Stud 9 (in the radar training circuit, one of which was speechless) and [the Juno] on Stud 10 in IF box D [an IF training area]. The Juno was to the southwest of Shawbury by approx. 15NM and was under a Traffic Service. Traffic Information was passed regarding the conflicting traffic. The Juno pilot reported visual and: "descending to avoid". Once clear, the pilot said: "returning to 2500ft, that aircraft made no attempt to avoid us".

The Shawbury Radar Screen Controller reported sitting behind a U/T controller, bandboxing Approach and Director. At the time, the Screen controller believed they had 4 or 5 aircraft on frequency. The Juno called complete in IF Box D and was routed for a RW36 arrival. Whilst routing in, affecting traffic was called and the Juno pilot became visual with the Basic Service aircraft [the BE55] showing as 300ft below. The Basic Service aircraft then appeared to climb fast paced as the Mode C dropped off. The Juno pilot then informed them that he was descending to avoid the aircraft, and that the Basic Service aircraft had taken no action to avoid him. The Mode C re-appeared on the Basic Service aircraft which was then 100ft above the Juno.

The Shawbury LARS Controller reported they could not recall a lot of detail from the day. Traffic levels were low at the time with a Traffic Service aircraft transiting to the northeast which was being monitored to make sure it was maintaining outside controlled airspace. It was during this time that the Screen controller, sat behind the U/T Approach controller, made the LARS controller aware of the Airprox and asked if [the BE55 pilot] was visual with [the Juno]. Unfortunately, [the BE55] climb was not noticed so Traffic Information was not passed. ■

For full details of this Report see AIRPROX REPORT No 2020095 on the Airprox Board Website.

Juno vs BE55 - Spry's Summary:

It is unfortunate that Juno was vectored into conflict with the BE55, likely caused by an element of distraction for the Shawbury LARS controller not to notice the confliction. However, the TCAS on board the Juno managed to alert the crew in time for them to get Tally and take timely avoiding action. This is a classic example of how a Collision Warning System is a key barrier to Loss of Safe Separation and serves to highlight the importance of utilising all available information to build situational awareness to avoid a mid-air collision. ■

21 Jul 20
Christen Eagle vs Tutor (Tutor on Recovery)
Airprox No 2020074

The Christen Eagle Pilot reported flying straight and level, assessing the balance of the aircraft at different speeds and making notes in order to make an adjustment to the fixed rudder trim tab after landing. Consequently, the pilot was checking the slip ball and looking down to make a note. This almost certainly contributed to the late sighting of the Tutor. When first sighting the other aircraft, it was in the 1 o'clock position, level and moving right to left at about 250m distance. It appeared to have been approaching from a relative bearing of about 030°. At the same time as seeing the Tutor, the other pilot rolled right, and the Christen Eagle pilot also rolled right. The pilot estimated that the two aircraft probably came within about 200m of each other.

The Tutor Pilot reported that, on recovery to base, a contact was noted on TAS at about 2NM, in the 10 o'clock position. The contact was sighted visually and deemed not to be a threat. The crew maintained visual with the other aircraft and had a discussion about the fact that it looked like the other pilot had not seen their aircraft. They watched the aircraft approach and deemed that it was of no threat to the safety of their aircraft. They were in a gentle climb in order to gain height to teach side-slipping and the student was directed to turn very slightly to the right whilst maintaining level. The other pilot seemed to see them and then take very sharp avoiding action in the form of hard turn to the right and down. At no point was it assessed that the other aircraft came within in 0.5NM. On returning to base the incident was mentioned to the Duty Authoriser. No Airprox was raised at the time as it wasn't believed that the safety of the aircraft was ever threatened.

The Wittering Controller reported having little or no recollection of the event and was writing the report 9 days after the event. No Airprox was called on the frequency at the time. Research showed that they were controlling the Tutor as it was recovering visually to Wittering aerodrome. Traffic was believed to be called to the Tutor pilot in the vicinity the Airprox, and the pilot's report indicated that they were visual. No further details were recalled. ■

For full details of this Report see AIRPROX REPORT No 2020074 on the Airprox Board Website.

Christen Eagle vs Tutor - Spry's Summary:

Although the crew of the Tutor didn't feel that there was any risk of collision, the pilot of the Christen Eagle did; potentially due to the late pick of the Tutor and being startled by its proximity. The collision warning system of the Tutor alerted the crew of the Christen Eagle enabling them to pick up an early 'tally' and to take some avoiding action. However, one can never assume that the other aircraft is 'tally' with you and therefore it may be prudent to give them a wider birth when manoeuvring out of confliction, avoiding the 'startle factor'.
This incident also highlights the importance of calling an Airprox over the radio; in this case, it should have been the pilot of the Christen Eagle. Although the Christen Eagle wasn't talking to an Air Traffic Unit, it is incumbent to get hold of a service to notify them that an Airprox has happened as soon as possible. This allows ATC to mark the tapes and impound the evidence, which may be critical in assessing why it happened and importantly, what could be done to mitigate against it. Leaflet 8204 in AP8000 explains the Airprox process and servers as an aid memoir for crews and is worth a read. ■

Safety Contacts:

Group / Station / Unit	Flight Safety Officers	Health, Safety & Environmental Protection Advisors
1Gp	01494 495454	-
2Gp	01494 495049	-
11Gp	TBC	-
11Gp Space and BM	03067707165	-
22Gp	030 6798 0101	-
38Gp	01494 497923	-
BM	03067707165	
JHC	01264 381526	-
Test & Evaluation (ASWC)	01522 727743	
1ACC	01522 603359	-
2FTS	01400 264522	-
3FTS	01400 267707	-
4FTS	01407 762241 6666	
6FTS	01400 266944	-
Air Cadets (RAFAC)	-	01400 0267817
Boulmer	01665 607325	01665 607282 / 7289
Benson	01491 837766 6666	01491 827109 / 7254
MOD Boscombe Down	01980 662087	01980 662312
Brize Norton	01993 895764 / 6666	01993 895525 / 7062
Coningsby	01526 346575	01526 347256 / 7196
Cosford	01902 704037	01903 37472 / 237
Cranwell	01400 266666	01400 267469 / 7498
Defence Geographic Centre	0208 818 2816	-
Fylingdales	-	01751 467216
Halton	01296 656666	01296 657640
Henlow	01462 851515 6150	01462 857604
High Wycombe	01494 494454	01494 496489 / 5094
Honington	01359 236069	01359 237782 / 7516
Swanwick	01489 612082	-
Leeming	01677 456666	01677 457637 / 7231
Leuchars	01334 856666	-
Linton-on-Ouse	01347 848261 6666	01347 847422 / 7617
Lossiemouth	01343 816666 / 7714	01343 817796 / 7697
Lyneham	-	01189 763532
Marham	01760 337261 6666	01760 337595 / 7199
No1 AIDU	020 8210 5344	-
Northolt	020 8833 8571	02088 338319 / 38521
Odiham	01256 702134 6666 / 6724	01256 702134 7650 / 7733
Scampton	01522 733053	01522 733325 / 3137
Shawbury	01939 250351 6666	01939 250351 7529 / 7559
Spadeadam	-	01697 749204
St Athan	01446 798394	01446 797426 / 8250
St Mawgan		01637 857264 / 7858
Syerston	01400 264522	-
Tactical Supply Wing	95521 7232	-
Valley	01407 762241 6666	01407 767800 / 7685
Waddington	01522 726666	01522 727652 / 7783
Wittering	01780 416377	01780 417611
Woodvale	01704 872287 Ext 7301	-
Wyton	01480 52451 7146	-
Overseas Flight Safety Contacts	**Telephone**	**Email**
Al Udeid	9250 060 451 3043	83EAG-DepFSO@mod.gov.uk
Ascension	00247 63307	BFSAI-ASCOpsOC@mod.uk
Akrotiri	94120 6666	Leigh.Robertson677@mod.gov.uk
83 EAG	9250 060 451 3050	83EAG-AIROPSFSO@mod.gov.uk
Gibraltar	9231 98531 3365	GIB-RAF-ASM@mod.uk
MPA	0050 073620 (94130 3620)	BFSAI-FLK-905EAW-ASM@mod.uk
Tactical Leadership Programme	0034 967 598527	aa3@tlp-info.org
Naval Air Station Jacksonville	001 904 542 4738	-

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