Drone dangers

The proliferation of drones presents emerging threat

INSIDE

• Situational awareness — on the ground and in the air
• Better reporting of Defence aviation safety events
• Non-Technical Skills — not just a name change
• Airworthiness Coordination and Policy Agency
Aviation is not an inherently dangerous profession but it is an activity where complacency or inattention can have severe and possibly fatal consequences. It’s also a profession that is constantly changing and evolving, where new hazards and threats emerge and existing hazards find new ways to manifest themselves.

All of us in the profession need to constantly manage these new hazards and identify new and improved controls to eliminate or mitigate these risks. As technology has improved, investigations into serious incidents and accidents reveal that the human in the loop can often be one of, or the primary, causal factor. Although this is true, I am also very aware that the maintainers and aircrew working in Defence Aviation prevent dozens of incidents and safety occurrences through their professionalism and diligence every day. Indeed, I regard humans as one of the most effective controls to mitigate these new emerging hazards. However, to do this effectively, we need to understand what is causing safety occurrences and update and improve our training and practices to continue to meet and best these new threats.

On a final point, as we approach Christmas and the opportunity to spend time with family and friends, think about the preventative controls that could save your life before you travel; start your trip well rested, drive in a well-maintained vehicle and plan your rest breaks to ensure that Mum’s prawns/turkey/pavlova are enjoyed by all of the family.

GPCAPT John Grime
Director,
Defence Aviation and Air Force Safety

Foreword

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By Rebecca Codey

Just 20 feet (six metres) was all that separated a RAAF PC9 and an unmanned aerial system (UAS) in the airspace above Western Australia’s coastline on a fine day in August.

The 2FTS crew of instructor and student were conducting a curriculum sortie, that involved an authorised transit from RAAF Base Pearce to Rottnest Island via Observation City, Scarborough, during the close call.

About 2 km north of Observation City the aircraft captain noticed a UAS, commonly known as a drone, at 270 feet and within 50 feet. It’s estimated the UAV was about 50 cm in diameter and weighed around 6 kg.

According to DDAAFs aviation safety investigators, if contact had been made with this large UAS, the results could have been catastrophic for the PC9 crew and the aircraft. The size and weight of a large bird, the UAS could have caused significant damage to the aircraft or smashed through the windscreen killing the crew. As a comparison, in 1977, an F-111 hit a pelican (about the same weight at the UAS), causing the death of the two crewmembers on board and the loss of the aircraft.

Bird strike is the best parallel aviation safety investigators can use when discussing the repercussions of impact between an aircraft and UAS. Despite the use of UAS becoming widespread in the civilian world, there have not been many serious incidents — reported to aviation authorities at least — to draw upon.

“While the likelihood of a drone strike can be correlated, to a degree, with current assessments of bird strikes, the consequence is largely unknown,” says SQNLDR Shane Rowe, Air Force Headquarters’ Command Aviation Safety Officer (CASO), who is in charge of the 2FTS-UAS serious incident investigation.

“I understand the UK Civil Aviation Authority (CAA) is about to, or has, injected a drone into a turbine engine. This will eventually provide some information on consequence.”

In what is believed to be the first incident of its kind, a US Army Black Hawk helicopter collided with a small drone in domestic airspace over New York City in September this year. The crew flew the Black Hawk at 500 feet over Staten Island while providing a security flight for the United Nations General Assembly meeting at the time.

“The collision caused minor visible damage to a main rotor blade and a window on the upper left hand side of the helicopter, which landed safely at Linden Airport in New Jersey,” says LTCOL Joe Buccino, 82nd Airborne Division public affairs officer.

The investigation into the collision continues; however, LTCOL Buccino says the Army is rethinking its procedures for domestic missions over populated areas. “We traditionally fly [in] restricted airspace or in combat, so this is a new experience,” he says.

“It is probable that we cannot entirely isolate ourselves from law-abiding drone operators, and impossible to isolate ourselves from the non-law-abiding drone operators. We need to be risk aware.”

With an increasing number of UAS (and ever-improving technology) on the market in Australia and around the world, this trend is only set to grow — and with that, the risk of an incident such as that over the west coast — or much worse.

UAS in Defence

From Defence’s perspective, the use of UAS has expanded exponentially within both the aviation and the traditional non-aviation units such as Defence Science and Technology Group and Combat Support Group, as explained by WGGDR Phil Sixsmith, Deputy Director Regulations, Airworthiness Coordination and Policy Agency (ACPA).

Existing Defence policy governing the use of UAS will be replaced by the end of the year with new regulations that are more contemporary and better aligned with global regulations. An important part of the development of the new regulations has been an examination of world and Australasian regulations.

“The new Defence Aviation Safety Regulations recognise that UAS are used in current operations by all services and provide — in limited situations — commanders at the appropriate level the ability to make decisions about UAS use, without seeking specific approval from the Defence Aviation Authority (Defence AA),” WGGDR Sixsmith says.

In a general sense, changes will include the removal of UAS categories 1 to 4 in the current regulations. Instead there will be three categories — Certified, Specific and Open — under which UAS may be used. While the size of the UAS remains a factor when considering classification, the most important element is the operational mission.

“Regulations are based on the risk the UAS poses to other aircraft in the air, or personnel and critical infrastructure on the ground,” WGGDR Sixsmith says. “For example, if the mission required the UAS to be flown over a populous...
ADF’s unmanned aerial system

In 2017 there were two UAS listed on the Defence Register – the Shadow 200 and the recently decommissioned Heron. The MQ-4C Triton is set to be introduced from mid-2023.

Shadow 200

Operated by Army, the Shadow 200 is a tactical aircraft with high-resolution cameras and laser systems. The Shadow can reach speeds in excess of 200 kilometres per hour, and has a wingspan of 6.2 metres. The Shadow ceased operation in June 2017.

Triton

Defence’s next planned UAS acquisition is the MQ-4C Triton, and is expected to be operational by 2023-24. Weighing in at 1.1 tonne, and has a wingspan of 16.6 metres and maximum speed of 180 kilometres per hour. Due to its size, the Heron is operated from an airfield runway and is operated by qualified pilots. The Heron ceased operation in June 2017.

UAS in the civil world

Civil Aviation Safety Authority (CASA) provides a plethora of information for civilians on flying UAS/drones/remote piloted aircraft (RPA) in Australia – whether flying for economic gain or for fun. CASA’s website covers issues such as when you require an RPA operator’s certificate, when you must notify CASA that you are flying the RPA, safety laws and rules and recent changes to legislation, how to gain your remote pilot licence and RPA certificate, where you can fly: emergency situations, privacy considerations, how to report unsafe activity, and links to other relevant resources.

CASA has a number of valuable tools, including an e-learning module and ‘Can I fly there? – drone safety app’, that can be found on the website http://www.casa.gov.au

References

1. DHARTS Aviation Safety Occurrence Report 2017-050 2017

Sources


During public-safety operations it can be tempting to use your RPA to get a better view. You should be aware that helicopters or emergency service RPAs often fly at lower altitudes during public-safety operations such as routine surf patrols, law enforcement, or firefighting bushfires. There have already been a number of close calls involving RPAs that have put public safety at risk. You are much more likely to see them before they see you, so for safety’s sake, keep well away from manned craft.

Access to some areas of airspace may be restricted because they present a potential hazard to aircraft operations. For safety or security reasons, particular airspace may be designated as being prohibited, restricted or danger areas.

If you have further questions about flying your RPA recreationally, contact CASA’s RPAS team via email rpas@casa.gov.au or phone 131 757 (ask for the RPAS section).

You should operate it far enough away that if something goes wrong it does not pose an unreasonable risk to life, safety or property. They should not be flown where they may create an obstruction to an aircraft taking off or approaching for landing.

* Dropping or discharging something from a RPA must not create a hazard to another aircraft, person or property.
* Where you fly your RPA is just as important as how you fly it, so it’s important to familiarise yourself with go/no go areas.
* If you are operating your RPA outside an approved area, you must keep it within sight at all times, keep it clear of populous areas and, unless you are outside an area of controlled airspace, stay below 400 ft above ground level.

When flying your RPA outside an approved area, be aware of where you are in relation to any nearby airports, aerodromes and helicopter landing sites. It is imperative that you do not create a hazard to any aircraft while it’s taking off or landing and you must keep away from the approach and departure paths of runways and landing areas. In addition, different rules apply to the airspace around airports depending on whether you are flying in controlled or non-controlled airspace.

If you fly low over a populated area, you must be able to maintain control of your RPA at all times — even in a go/no go area. When you lose sight of your RPA you must cease flying it immediately.

You must ensure that when you operate a RPA that it must not be operated under a UAS Operating Permit (UASOP); Specific Type B – must be operated in line with the UAS standard scenarios with a pre-defined set of controls, as approved by the Defence AA.

If you are flying your RPA outside an approved area, you must keep it within sight at all times, keep it clear of populous areas and, unless you are outside an area of controlled airspace, stay below 400 ft above ground level.

You must not fly your RPA while it’s taking off or landing and you must keep away from the approach and departure paths of runways and landing areas. In addition, different rules apply to the airspace around airports depending on whether you are flying in controlled or non-controlled airspace.

Similarly, CASA’s e-learning module is packed with everything you need to know to safely and legally fly a remotely piloted aircraft (RPA) (unmanned aerial system/drone) in Australia – from a micro RPA at less than 100 g to a large RPA weighing more than 150 kg.

Shadow 200 flying at 500 feet over Sydney harbour. Image captured from the back of an MRH90 by LS Jordan Berkhout, B0858m

CASA’s e-learning module is packed with everything you need to know to safely and legally fly a remotely piloted aircraft (RPA) (unmanned aerial system/drone) in Australia – from a micro RPA at less than 100 g to a large RPA weighing more than 150 kg.

What follows is a selection of CASA’s requirements for piloting a small RPA for recreation.

• When operating your RPA it must be within your visual line of sight – in other words, you must be able to continually see, orient and navigate without the use of binoculars or a telescope. If you want to operate it beyond these boundaries, you must contact CASA for approval.

• General users can only fly RPA during the day and keep clear of cloud. You must not fly in any weather conditions that stop you, or pilots of other aircraft, from seeing your RPA clearly, such as smoke, mist, or fog.

• You must operate your RPA at least 30 m away from people or their property. Flying close to populated areas, such as crowded beaches, parks, sports ovals where a game is underway or other people’s backyards is strictly off limits.

Shadow 200
A C-17A was grounded for a week after being struck with the back of an elevating work platform (EWP) during maintenance.

A panel on the left-hand shoulder of the aircraft (just forward of the wing root) had to be removed during intermediate servicing. Two maintenance personnel – a tradesperson (TP) and a maintenance manager (MM) – used an EWP to gain access to the panel.

As they powered the EWP upwards, they heard a noise and found that the basket may get too close to the engine. The MM and TP admitted that when they went out to the EWP they thought the basket may get too close to the engine, but did not actually highlight it as a cause for concern.

The MM assumed the role of a spotter while the TP drove the EWP. The TP was trained, authorised and deemed competent in EWP operation. The MM was overseeing the intermediate servicing and their primary role was to manage tasks, personnel and resources. However, for this particular task the MM decided to assist and become directly involved in the job, rather than directing other maintenance personnel to do the task.

The TP was not previously involved in the servicing and was brought in to assist with this particular job.

In this instance they went about the task in the same manner they had done in the past. The TP assumed the MM was aware of their responsibilities as a spotter and, therefore, there was no prior briefing or planning between them before they conducted the task.

As a result when the TP drove the EWP upwards, it was assumed the MM would be observing the opposite direction to the TP. Instead both members were looking in the same direction and the rear of the basket struck the engine.

It was eventually determined the cause of the occurrence was that the technicians did not establish communication when planning and executing the vertical operation of the EWP. This inadequate planning saw both technicians lose situational awareness of the EWP, culminating in impact damage to the aircraft.

The MM and TP admitted that when they went out to the EWP they thought the basket may get too close to the aircraft, but did not actually highlight it as a cause for concern.

The MM assumed the role of the spotter while the TP drove the EWP. The TP was trained, authorised and deemed competent in EWP operation. The member had carried out several tasks previously requiring EWP operation.

The damage required an unnecessary aircraft unavailability of a primary Air Force asset.

In years to come, responding to global and regional events will pose new challenges with the growth in technology and transformational change within the Defence Aviation environment.

Defence Aviation must evolve to rapidly harness the potential of emerging technologies in order to meet these new challenges.

The ability to proactively manage risk, reactively learn from safety occurrences, and to achieve continuous improvement within the safety space, will play a critical role in Defence Aviation maintaining its excellent track record and enhancing future capability.

Better reporting of Defence aviation safety events

Defence’s new aviation safety report (ASR) will make recording safety events easier and result in better quality data – enhancing our ability to learn from experience and take action to improve safety.

Delivered by DDAAFS, the Aviation Safety Management Information System (ASMIS) Project replaces the ageing Defence Aviation Hazard Reporting and Tracking System (DAHRTS) by providing ASR within the existing Sentinel system in February 2018.

The ASR has completed user acceptance testing (UAT), having been put through its paces by a group of 80 testers across four sites since mid-September. Any system errors experienced by the testers will be resolved before the system is released.

Following UAT, the project is progressing into the training phase, with transition training available to users employed in a Defence aviation unit. According to Project Manager Linda Horden, the one-day course will cover the new methodologies, policy, taxonomies, workflow, and system process as well as an ASR introduction to Sentinel.

Defence Aviation has an outstanding safety record across a broad spectrum of training and operations, from counterinsurgency to humanitarian support.

“In the new system, if other is ‘other’, with 7000 instances,” Ms Norden explains. “In the new system, if other is selected at any point, the user will be required to specify what it is. This will result in meaningful data in Sentinel and COGNOS.”
By SQNLDR Clare Fry

Non-Technical Skills

I t’s long been recognised in aviation that it’s not just an individual’s technical knowledge and skills that impact safety and performance, but their non-technical abilities as well. The term non-technical skills (NTS) describes skills such as the ability to recognise and manage human performance limitations, to make sound decisions, communicate effectively, lead and work as a team and maintain situation awareness.

NTS are sometimes referred to as the soft skills, but that diminishes their impact on performance. When coupled with effective technical skills, NTS can be the difference between acceptable and outstanding performance. The nature of military operations, complex, dynamic and often conducted in challenging environments, warrant an increased emphasis on NTS.

By SQNLDR Clare Fry

Aviation has learnt the hard way. A number of accidents have highlighted the importance of NTS, notably the collision of two Boeing 747’s in Tenerife in 1977, where 583 people were killed. The accident report highlighted failures in communication and situation awareness. More recently, Air France 447, which crashed into the Atlantic Ocean in June 2009, highlighted the importance of NTS in reacting to unexpected events. The accident report noted that the crew failed to accurately recognise and comprehend the stall, and were therefore unable to respond appropriately. Defence aviation is not immune, NTS have, and continue to be, featured in accidents and serious incidents.

It’s not just tragedy that teaches us lessons, humans are innovative problem solvers and this was recently highlighted in aviation by US Airways, Flight 1549, where the crew landed an A320 into the Hudson river following a bird-strike after take off and with subsequent loss of all engine power, or QF 32, where the crew safely landed a Airbus A380 with an uncontained engine failure (and subsequent damage to a range of aircraft structures and systems). Both of these recoveries were attributed to a range of NTS, including sound decision making, effective communication and good leadership and teamwork.

Targeted human factors training programs have a long history in aviation, and have evolved as the industry learns lessons, and as aviation technology changes the way we operate. In the late 1970’s, cockpit resource management had a focus on management and interpersonal skills. As the programs evolved, they became known as crew resource management (CRM) and began to include a number of occupations, including cabin crew, air traffic controllers and maintenance personnel. In the ADF, similar programs have existed for many years but formal, systemic CRM programs were first introduced in the 2000s. Specific programs for engineers and maintainers have evolved from these NTS programs are the latest evolution, and bring the ADF into line with our military and civilian counterparts. It also emphasises the importance of integrated technical and non-technical skills to effective performance.

DASM AL7, published July 2017, introduced the term NTS and a new training framework to support Defence aviation personnel working in high-risk occupations. The framework lays out the requirements for NTS education in initial and conversion courses, and for ongoing continuation training. DDAAFS Aviation Non-Technical Skills Foundation course ensures Defence Aviation personnel have basic HF and NTS knowledge and supports the development of practical skills.

The course is to be incorporated into curriculums for initial aviation and aviation related trades. DDAAFS is working with a number of schools to ensure effective integration of the courseware. As well as ensuring standardised knowledge across all trades and occupations, this offers a number of efficiencies across the training continuum.

NTS Theory needs to be contextualised for platform and type of operation, so DASM AL7 requires conversion and refresher courses to also include NTS training.

There is no standardised pack and DDAAFS recommends the use of case studies to develop this training and can provide guidance and support to structure the courseware. It is also necessary to reinforce and update HF and NTS theory on a regular basis. DASM AL7 requires continuation training that includes situation awareness, decision-making, communication, teamwork, leadership, stress management, coping with fatigue and culture every two years for all airmen, JBA, UAS pilots and operators, engineers, and maintenance personnel. DDAAFS provides packages online to support continuation training.

Classroom-based training is only the beginning. For skilled performance, individuals must also have the opportunity for active practice and feedback. One aim of a mature system is to have NTS training and assessment incorporated into simulator or line proficiency checks.

Specific evidence-based techniques, such as the DDAAFS recommended Method for Assessing Personnel Performance (MAPP), should be used. More information is available on the DDAAFS website, and DDAAFS is able to provide guidance and support.

Delivery of all NTS training, including foundation, conversion/refresher and continuation, requires a DDAAFS Aviation NTS Trainer proficiency. The NTS Trainer Course replaces Safety Facilitator Course (SFC) and provides personnel identified as NTS trainers with the knowledge and skills to deliver the courseware, as well as introducing students to scenario-based training and assessment techniques. Individuals who have previously completed CRM Facilitator or SFAC courses, and are current (that is, have conducted NTS/CRM or MHF training within the past three years) may continue to deliver NTS training.

The new NTS framework is designed to ensure Defence Aviation personnel are able to meet their full potential for safe and efficient operations and introduces a number of efficiencies across the training continuum. DDAAFS will continue to work with organisations to ensure smooth integration of courseware. DDAAFS focus for the future will be on enhancing NTS training and assessment programs beyond the classroom. More information is available in the DASM Section 3 Chapter 6 online at DDAAFS NTS Courses or by emailing the DDAAFS ASAT section at DDAAFS.ASAT@defence.gov.au.

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Something doesn’t seem quite right

How well do you understand another stakeholder organisation’s aviation safety culture?

Name supplied

You are probably very comfortable with “the way things are done around here” in your own workplace – but how well do you understand the aviation safety culture that exists in other organisations that have a stake in your mission?

Does the stakeholder organisation share the same aviation safety beliefs, attitudes, values and behaviours as yours?

I work for one of the air base operations squadrons and our job is crucial to capability and aviation safety – we operate an aerodrome. Following is an account of how a ‘for information’ email very quickly developed into a valuable lesson that regardless of your role in delivering aviation capability, it’s important to be mindful of the aviation safety culture of your stakeholders.

After going for a midday run and grabbing some lunch, I returned to my office and launched into my standard after-lunch routine – start with all the action-addressee emails and then grind through the plethora of information-addressee emails that I have received since leaving the office.

On this particular day, I eventually arrived at an information-addressee email in which, two hours earlier, local ATC had reported a situation where an infrastructure works contractor conducting time-limited works on a taxiway had vacated the taxiway leaving it covered in slurry after completing two parallel saw cuts across the full width of the taxiway, that is, the taxiway had been left in an unsafe condition.

Only in response to an ATC interrogative seeking assurance that the taxiway was FOD-free did the WSO inform ATC the taxiway was, in fact, unsafe, and the aircraft was consequently recovered via an alternative taxiway.

At this point, something didn’t seem quite right and my aviation-safety instincts were screaming at me to immediately investigate this situation further.

Sure, I was only an information addressee on the email and the occurrence had been reported more than two hours previously, so it was certainly conceivable that any other hazards would have been identified by now – but I’m part of an aviation safety culture that values people who are proactive and not afraid to question hazards. So I immediately jumped into my vehicle and went onto the airfield to get my eyes on the situation.

This is what I discovered during my initial inspection:

- Two parallel saw cuts, spaced 400 mm apart and located between the holding point and the runway, had been made across the full width of three of the four operating taxiways.
- Poor execution of one of the parallel saw cuts on one taxiway had resulted in realignment of the cut and a thin residual sliver that deviated from the primary cut for 150 mm.
- On the same taxiway, a 300 mm-long equilateral triangle had been cut between the parallel saw cuts. The triangle cuts penetrated through the bitumen layer and I was able to pull the unsecured shape out of the taxiway.
- The unsecured triangle shape presented a hazard to taxiing aircraft. The subsequent detailed investigation revealed:
  - The saw cuts had fully penetrated through the bitumen layer on each affected taxiway and the resulting reduction in pavement stability presented a hazard to taxing aircraft. The subsequent hazard treatment required extensive monitoring and considerable repair effort.
  - The affected taxiways were assessed as significant FOD hazards and the taxiway remained unavailable for two weeks.
  - The time-limited works on the affected taxiways had not been approved.
  - The WSO did not carry out the correct safety inspection.
  - The aircraft had recovered via the taxiway presenting the greatest safety risk – the unsecured triangle shape and the fragile deviated cut.
  - Another, larger, aircraft had also recovered via the most-affected taxiway before discovery of the hazards.
  - Several actions and lessons were generated by this occurrence; however, I noted the importance of two key safety behaviours:
    - If something doesn’t seem quite right, investigate immediately.
    - Understand and contribute to the aviation safety culture within key stakeholder organisations. For example, regularly participate in contractor toolbox briefings and WSO worksite safety briefings.
Airworthiness Coordination and Policy Agency

By GPCAPT Terry Deeth (DACPA)

ACPA is a small AFHQ agency of just over 20 dedicated personnel consisting of operators, engineers and support staff, representing the three ADF services and APS. Although an AFHQ agency, ACPA has tri-service responsibilities and is one of seven directorates and agencies within the Defence Aviation Safety Authority (DASA) that are responsible for the oversight of Military Air Operators and Service Providers with DASR (Defence Aviation Safety Regulations). ACPA is responsible for the development, support and implementation of the Defence Aviation Safety Regulations (DASR) and for conducting compliance assurance audits, preparing and conducting oversight program to ensure organisational transition to full DASR compliance. The DASR for which ACPA is responsible is 95 per cent identical to the EASA Initial Certification Regulation (DASR) for which ACPA is responsible. ACPA is a small AFHQ agency of just over 20 dedicated personnel consisting of operators, engineers and support staff, representing the three ADF services and APS. Although an AFHQ agency, ACPA has tri-service responsibilities and is one of seven directorates and agencies within the Defence Aviation Safety Authority (DASA) that are responsible for the oversight of Military Air Operators and Service Providers with DASR (Defence Aviation Safety Regulations). ACPA is responsible for the development, support and implementation of the Defence Aviation Safety Regulations (DASR). ACPA has a Projects team and an Aviation In-Service Review team. Between these two teams, ACPA manages and supports up to 40 AwBs each year. Each AwB has an assigned Desk officer who is responsible for the collection and collation of AwB submissions and the production of the AwB pack that is sent to the Board members. As there is a large amount of data included in an AwB pack, the mission is to ensure that the timelines of AwB submissions to ACPA are paramount to allow sufficient time for the Board members to review the information provided. The desk officer also provides secretarial support to the AwB and drafts the ABR on behalf of the AwB. ACPA is a small AFHQ agency of just over 20 dedicated personnel consisting of operators, engineers and support staff, representing the three ADF services and APS. Although an AFHQ agency, ACPA has tri-service responsibilities and is one of seven directorates and agencies within the Defence Aviation Safety Authority (DASA) that are responsible for the oversight of Military Air Operators and Service Providers with DASR (Defence Aviation Safety Regulations). ACPA is responsible for the development, support and implementation of the Defence Aviation Safety Regulations (DASR). ACPA has a Projects team and an Aviation In-Service Review team. Between these two teams, ACPA manages and supports up to 40 AwBs each year. Each AwB has an assigned Desk officer who is responsible for the collection and collation of AwB submissions and the production of the AwB pack that is sent to the Board members. As there is a large amount of data included in an AwB pack, the mission is to ensure that the timelines of AwB submissions to ACPA are paramount to allow sufficient time for the Board members to review the information provided. The desk officer also provides secretarial support to the AwB and drafts the ABR on behalf of the AwB.
What a nice dream I was having... I was in the front seat of a multi-role fighter over a sun-swept valley on a bright sunny autumn day. Everything was serene and quiet, and a warm feeling of satisfaction pervaded my every pore...

That’s when things started to get uncomfortable – very uncomfortable. As my dream started to fade, reality began to force its way in, slowly at first and then it became a torrent that hauled me into reality. It was very disturbing, the most disturbing sensation I have ever experienced in my many years of aviation.

My brain was rebooting like a computer, coming online in-series, and the first question my consciousness answered was a big affirm to, “Am I actually in an F/A-18F Strike Fighter?” My mind was racing ahead asking questions that my logic was still unable to process. The inner monologue would have sounded something like this:

Conscious mind: “What do you mean I’m flying in a jet? Why am I flying this aircraft and how did I get here?”

Brain: “A fatal exception error has occurred in the cerebrum, the current program will be terminated. Hit any key to continue.”

Conscious mind: “Where am I in space? Am I pointing at the ground?”

Brain: “A fatal exception error has occurred in the cerebrum, the current program will be terminated. Hit any key to continue.”

Unconscious mind: “Awoogah Awoogah, fight or flight go! Hypothalamus, activate the sympathetic nervous and the adrenal-cortical systems.”

Conscious mind: “Who the hell is actually flying this aircraft? Is it supposed to be me? Where are my hands at the moment? I’m sitting in the front seat, right?”

Brain: “Cerebrum back online. Yep, you are in the front seat of an F/A-18. You are not holding any controls. Control of your hands is now reconnected.”

Conscious mind: “TAKE CONTROL OF THE AIRCRAFT NOW! Any update on aircraft attitude? I’m feeling wired, I think I can feel every nerve connection in my body and I’m feeling flushed; think my heart might burst!”

Brain: “Aircraft appears straight and level on a clear vector, hands are on controls, no immediate control inputs required. Calm down, the immediate danger has passed.”

Unconscious mind: “Stand-down the fight or flight response”.

At this stage many more answers were being provided, and as I tried to make full sense of my situation, I heard a voice with an American accent say, “You have control”.

Conscious mind: “Who said that?”

It was night right at that moment, all my memory files became accessible and my reality was present and correct. I knew where I was, who I was, what I was doing, and what had just occurred.

In July 2010 I was posted to undergo F/A-18 Super Hornet training with VFA-122 at Lemoore California. I had just completed a tour at 6SQN flying the venerable F-111 and was embarking on a new journey to transition from being a Strike pilot to a Strike Fighter pilot. VFA-122 is the United States Navy (USN) Strike Fighter west coast Fleet Replenishment Squadron (FRS) and had more than 90 aircraft on the books and flew an 80-to-100 sortie-a-day program. To say it was an immense and impressive operation would not do it justice. Hundreds of instructors and students were posted to the unit. So many aircrew in fact, that sharing life-support gear was a common occurrence at the squadron.

The day I had my G-induced loss of consciousness (GLOC) event was Tuesday 19 October 2010. I had been at VFA-122 for four months and had completed the Super Hornet conversion and strike phases of the course. The sortie conducted on the day was a USN 1v0 mission prior to commencing the Basic Fighter Manoeuvres (BFM) phase of the course. A 1v0 sortie conduct is what RAAF aircrew know as Maximum Performance Handling (MPH). The weather was suitable, there were no limiting NOTAMs, myself and my USN Instructor Pilot (IP), Donnie, had briefed the conduct and were given an up-jet that was in a trainer configuration (the aft cockpit was configured with flight controls; this was standard procedure for the first two flights in BFM phase of the USN operational conversion course). As the IP, Donnie was the Aircraft Commander flying in the rear seat.

After I heard and processed Donnie’s voice command, “You have control”. I immediately replied, “Negative, you have control Donnie. I GLOC’d”. Donnie took control and we commenced the RTB. He was not aware that I had taken a nap until I told him. I was groggy and definitely not running on all cylinders during the recovery, but we were close to base and on deck in 10 minutes.

By SQNLDR Shannon Kennedy
I had handed over, he did a textbook 7.5 G break turn and put me to sleep where I had the lovely dream, that turned out to be a brief nightmare.

So, what had happened? We had completed the IvO sortie conduct and with remaining fuel in the tanks I decided to practice more break turns. The Super Hornet is limited to 7.5G at the lighter fuel weights we were at, but I was unable to reach the full G load before beginning to grey-out, so I came off the G early at about 6.5G. After two not-so-impressive break-turns Donnie requested to take control and practice a break turn from the back seat. I handed over, he did a textbook 7.5 G break turn and put me to sleep where I had the lovely dream, that turned out to be a brief nightmare.

I learnt some valuable aviation lessons that day. Firstly, just because you have aviation experience doesn’t mean it can’t happen to you. I had more than 1000 hours on the F-111, but this type of high-G flying was completely new to me. I was a novice at it and should have given it more respect. I was complacent about the physiological effects of flying high-performance fast jets.

Secondly, always, always, always practice good and effective CRM in the cockpit. If I had spoken up and told Donnie that my G tolerance was not good before he took the aircraft, we wouldn’t have conducted the last break turn and I would not have GLOC’d. As it turns out, I had GLOC’d the ‘safe way’, with Donnie always in control of the aircraft while I was off with the fairies, but I didn’t know that for a period of time airborne and that was sheer terror.

Directly following my GLOC event I presented to the VFA-122 Flight Surgeon. We went through my 72-hour history, AGSM technique and flying clothing. My AGSM technique was fine, but I attended the vonson the second time to refine my technique and get back on the high-G course. As per my first training in the centrifuge, I had no issues, but to say that I had to be coaxed to get in the thing the following day was an understatement! The USN personnel were excellent, very helpful and obliging, and they got me done and ready to fly again in a short period of time.

The GLOC flight was an early morning takeoff the same as my flight the day before. I was up at 0430 to make the takeoff at 0730; these flights directly followed some late nights on the weekend. Both mornings I had eaten a banana and had a glass of water, a little better than the ‘80s fighter-pilot breakfast of a Mars Bar and a can of Coke, but still not great. My G suit was not nearly as tight as it should have been, which had not been a factor during the conversion and strike phases. With gear sharing at the squadron, the G-suit had loosened and I hadn’t requested it tightened and lightened by the USN parachute riggers (PRs; USN ALS types). All up, the GLOC was a combination of fatigue (both from the sortie conduct on the day and insufficient rest), poor G-suit fitment, poor breakfast choices and a poor decision not to tell Donnie my G tolerance was low.

So here are my GLOC lessons that I have applied to all high-G sorties since the event:

• Understand your personal G tolerance will vary from day to day given external and internal factors; rate your tolerance during the G-warm and fly the remainder of the sortie according to that tolerance.

• Practice good CRM in the cockpit; always tell your crew-buddy if you have an issue, or you think your have an issue with your G tolerance.

• Ensure your life-support gear is correctly fitted and is functioning correctly both on the ground and in the air.

• Eat a proper meal and drink lots water to increase blood volume.

• Periodically check the correct AGSM technique on the ground.

• Exercise.

• Attempt to track your own fatigue level the best you can. Tell your crew-buddy, flight lead or flight authoriser if you think it might affect your performance.

It’s not rocket science; the above lessons are taught to RAAF aircrew on all high-performance aircraft courses and during AVMED. Don’t learn them airborne the hard way as there is not always someone in the back providing a safety net.

I have carried this close call with me to this day. The people around you are having the same struggle to get grey-out, so you don’t affect every minute of the day or night by what they carry around with them. It may not always be obvious, or easy to evaluate but it’s there, and it changes constantly.

Needless to say in those seconds I was waving my arms and yelling at the top of my lungs, (not that he could have heard me), and grabbing the headset mouthpiece to get the runner to shut down the engine, all the while in the back of my mind I was thinking I should get ready to turn around and close my eyes.

I asked one of the extra troops to escort the member safely off the flightline and wait for myself and the sergeant in the section.

When maintenance was finalised, I asked the troop to come into the office to chat about the situation.

I asked a few pertinent questions attempting to get to the bottom of his actions; after all he was experienced enough to know better. His answers were not what I had expected.

In essence, a build-up of personal circumstances were consuming his thoughts and actions. None of which he mentioned or let on about before stepping onto the flightline that morning.

Human factors are real and affect even the most experienced and reliable of our people.

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By Brian Woodard-Knight

Many years ago, I was a radio technician (Air), working out of ARDU at what was then RAAF Base Laverton. At that time we operated a range of aircraft including CT4, Macchi, Iroquois, DC3 and the ubiquitous Canberra Bomber.

It was an exciting time – working on such a range of aircraft was a huge opportunity for a young bloke. A side benefit was the ARDU role of calibrating all military airfield landing systems, TACAN, ILS et cetera, which involved travelling around Australia in a day-glo-painted DC3. For many, the pace of work and frequency of travel was somewhat of a challenge.

One particular young man (not me) succumbed to the need for rest and took up a space in the rear radar compartment of a Canberra that was on the line. The compartment is used to store various blanks and remove-before-flight items as well as housing the radar unit. It’s quite a spacious area. This individual fell into a deep sleep and was very comfortable in his tarmac jacket and ear muffs.

The aircraft was scheduled for a flight later in the day; however, this was of no concern to him at the time.

Needless to say the aircraft was BF’d, the radar compartment was closed, the aircraft started and commenced taxiing to the runway. I don’t know if you’ve ever witnessed a Canberra start-up, but the firing of the 20 mm cartridges to start the blades turning would wake the dead in a hurry. It doesn’t matter how many times you’ve done it, you will always jump.

The airman certainly woke up when the cartridges fired, but the hatch was closed and he had no way of exiting the aircraft. Then the aircraft started to move and he became more desperate.

The Canberra’s control cables run down the centre of the aircraft and through the top of the radar compartment. So the only logical thing the airman could do was to start swinging off the cables to get the pilot’s attention.

In the flight line we witnessed the rudder slamming side to side just before a call from the tower to get a maintenance crew to the aircraft, “something is terribly wrong here”.

Ultimately the airman was retrieved from his self-imposed prison and the aircraft completed its assigned task.

While humorous in hindsight, this event highlights the significant safety issue of fatigue. There could easily have been a death if the pilot had remained unaware of the airman in an unpressurised bay.

Following this incident there were a number of initiatives implemented at all levels of the squadron including:

- A significant focus on fatigue management for all staff. This training included recognising fatigue warning signs in yourself and others, as well as establishing and managing improved requirements around work/rest ratios.
- Refresher training on the responsibilities of tradespersons with regard to aircraft safety and security (this consisted of a CT session led by the imprisoned airman).
- Refresher training for all supervisory staff on the responsibilities of personnel management. This included a requirement to know when and where people were and to be aware and manage fatigue levels.
- Aircrew were required to review the incident and recognise the importance of a comprehensive walkaround.

It is important to note that this incident occurred in the early 1970s, well before fatigue management was a commonly understood issue. The ARDU management team from that era should be recognised for their response. The individual was reprimanded, but the bigger issue was identified and addressed with the best information that was available at the time.

Caught napping
Aviation non-technical skills courses

DASM AL7 introduces a new training framework to replace the CRM and MHF programs

Key changes include:

A change in terminology from Crew Resource Management (CRM) or Maintenance Human Factors (MHF) to NON-TECHINICAL SKILLS (NTS). The term NTS denotes targeted human-factors training designed to promote reliable and effective performance. It promotes the integration of technical and non-technical training and assessment and recognises that not all Defence aviation personnel work in crew-based environments.

Aviation NTS Trainer Course replaces SFAC and prepares participants to deliver NTS Foundation and Continuation and awareness training.

Aviation NTS Foundation Course replaces CRM and MHF Foundation courses and will be integrated into all initial employment training for aviation-related trades.

Aviation Continuation Training replaces refresher training sessions and consists of targeted scenario-based NTS training packages developed by DDAAFS. It must be conducted every two years for all aircrew, JBAC, ABM, UAS pilots and operators, engineers and maintenance personnel.

The new framework supports a move beyond classroom-based NTS training to the conduct of skills-based training integrated into the broader training system. There are several evidence-based techniques for assessing performance. DDAAFS recommends using the Method for Assessing Personnel Performance (MAPP) contained in the DASM.

For more information on NTS visit the DDAAFS intranet homepage
Are you aware?

The Defence Aviation Hazard Reporting and Tracking System (DAHRTS) will be replaced in February 2018.

The Aviation Safety Management Information System (ASMIS) Project is delivering a better aviation safety reporting system that will enhance Defence’s ability to learn and take action to improve safety.

Information packs and training opportunities are on the way.

Get ready for 2018

For more information visit the DDAAFS intranet