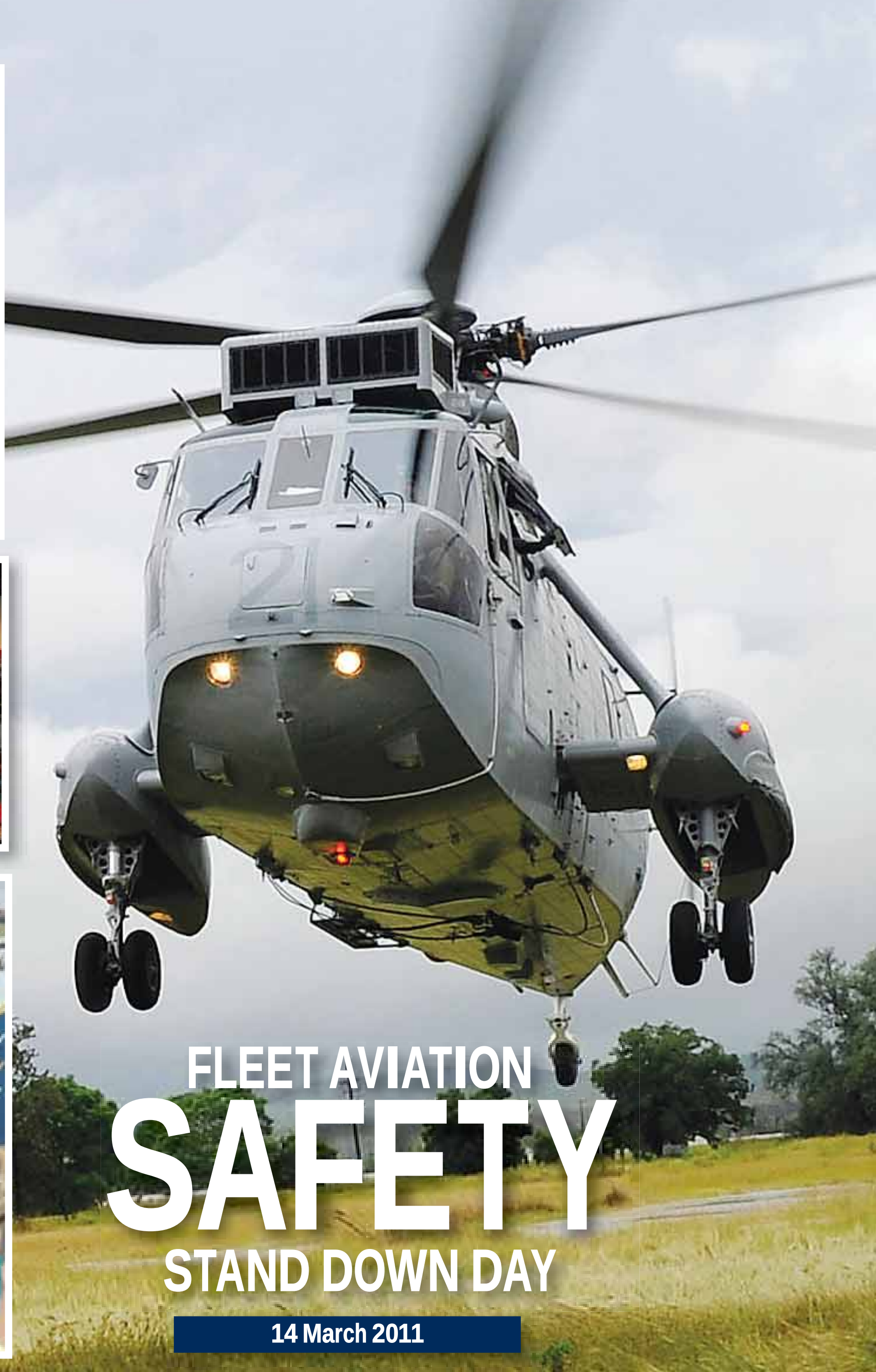
APRIL 2011

TOUCHDOWN

THE FLEET AIR ARM SAFETY AND INFORMATION MAGAZINE



FLEET AVIATION SAFETY STAND DOWN DAY

14 March 2011

FLEET AIR ARM SAFETY CELL

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CPOPT Annie Schofield (Assistant Editor) Tel: (02) 4424 2328 Fax: (02) 4424 1604 Email: navyairsafety@defence.gov.au. Contributions are invited from readers across Navy, the ADF and the retired community in the interest of promoting Aviation Safety and Safety Awareness throughout the RAN.

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AVIATION ACTION PHOTOS NEEDED

Send YOUR aviation photos into TOUCHDOWN to win prizes. Closing Date 01 August 2011.

Photos of Aircraft & People in a Navy Aviation environment will be used to create the next Safety Stand Down Day Poster in November.

The winning photos that appear on the Safety Stand Down Poster will also be in the December Edition of TOUCHDOWN. All photos used will be credited.

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navyairsafety@defence.gov.au

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Fly Navy
Fly Safe

Foreword

BY CDRE P G LAVER, RAN
COMMANDER FLEET AIR ARM
(COMFAA)

A great deal of information passes over my desk. In recent weeks, I have been delighted to receive many messages of praise for the excellent work achieved by Fleet Air Arm (FAA) staff in their flood relief duties in Queensland and Victoria. Of course, the headlines may dwell on the more visible achievements of aircrew, but we are a team in the FAA, and realise that nothing gets done without the extraordinary effort of our aviation technicians. I join the Australian community in thanking all of you for 'digging-deep' when our citizens were in harm's way. I am proud of each and every one of you.

As one of our senior politicians reflected in an OP FLOOD ASSIST Command briefing, 'the mere presence of our Defence Force personnel brings a notable calmness to community'. We demonstrated again that we were ready and able to respond to short-notice tasking, preparing two Flights to embark over the weekend of 12/13 March in response to potential tasking concerning the Japan Tsunami. We hold a privileged, trusted and highly regarded place in the Australian community.

We take our ability to respond to such need almost in our stride, this being a tacit part of the FAA's personality, and a reflection of the 'Australian way'. However, our ability to respond quickly, safely and effectively comes from a robust organisation underpinned by good people, good governance and an environment where we are held accountable for our actions. To be the best means we must demand the best, and in order to assure excellence, we must all remain dedicated to a just safety culture where all are treated equally and fairly, irrespective of their rank or job.

It is noteworthy that the number of serious maintenance and aircrew-related violations has diminished since 2005, evidence that the hard-won lessons of our recent history are taking hold in the FAA.

The investment in our people and safety programs is paying dividends, in the form of fewer serious ASORs and enhanced operational capability. I am very proud of our safety focus and system. But we cannot relax, because any serious departure from the safety-management framework that oversees our maintenance and operational performance, can imperil ourselves and those around us!

What, then, is a 'serious departure' from the standard expected of a reasonable maintainer or aircrew member? The Navy Safety Systems Manual at Part 1.3.9(c) clarifies this matter in its description of a 'just' safety aviation culture as one in which *'there is a well-defined line between the acceptable and the unacceptable.* ***The nature of human error is understood [by all] and wilful violations are not tolerated****. The workforce knows and agrees on what is unacceptable.'*

Our most recent attitude survey would suggest there remains a concern that aircrew are treated differently from their technical peers in the event of their committing a violation, or if the subject of an adverse finding for reckless workplace conduct. The ol' *'one rule for them, and another rule for the lower deck'* story! Be assured, this double-standard will not occur on my watch. I am accountable for my decisions, as are each of you – the differences are solely of authority, scale and scope.

There has been an extraordinary investment in the FAA's just safety culture in recent years, and given the findings and recommendations of the SHARK 02 Board of Inquiry, there was a necessary focus on addressing the systemic shortcomings in our maintenance culture. An important aspect of this is that maintenance anomalies are rigorously investigated and that where technical maintenance violations are alleged, accountability of the individuals concerned is considered through disciplinary or administrative processes.

Ensuring such accountability is, amongst other things, what defines us as among the best in our business. This applies equally with regard to alleged incidents

ABOVE Residents are evacuated by a RAN Sea King helicopter during the Christmas floods experienced in central Queensland.

of inferior or inappropriate flying performance, be it in the training or operational arena. Aircrew Advisory Boards (AAB), are convened as necessary to consider such allegations and hold aircrew members accountable for violations. As with their technical colleagues, aircrew may have their cases considered for disciplinary action, or the full range of adverse administrative consequences common to every Service member. The treatment of errors (not amounting to negligence or recklessness on the part of an FAA member) will not be dealt with in this manner.

I assure every member of the FAA that equal treatment of all is a fundamental philosophy of my Command. Alleged violations by maintainers, engineers or aircrew are viewed through the same ‘just' safety culture lens.

As well as ensuring a rigorous approach to avoidance of violations and assurance of compliance, we need to foster a culture of individual growth and professionalism, in an environment where we make good decisions based on careful, considered management of risks. This is to say, **in addition to achieving regulatory compliance and a violation-free environment**, I envisage a culture where we:

- grow members who recognise the importance of acting within the scope of their authority and are prepared to propose potentially better practices for consideration by those with the authority to judge them,
- grow leaders who are prepared to listen to new ideas and act upon them, and
- grow individuals who have the experience, skills and system support to think and act ‘outside the box' when the circumstances demand, and after careful consideration of the risks, have the professional integrity to report when this is perceived to be necessary, and acknowledge they are accountable for their decisions.

If we take heed of this vision, with the support of a committed FAA leadership team, we will achieve an environment of trusted empowerment for every person, which will naturally continue to develop our strong morale and foster an individual sense of purpose and achievement. A lofty goal perhaps, but these observations reflect my image of our FAA as a force that makes the citizens of Australia feel at ease upon our arrival in their time of need.

I seek your understanding and support for the need to draw a line between acceptable and unacceptable work practice and behaviour, that cannot be crossed by our people, irrespective of their role in the FAA team. We can only ever be as strong as our weakest link in matters of aviation safety and professional endeavour.

CDRE P G LAVER, RAN
Commander Fleet Air Arm
(COMFAA)

CPOATA Stu Walters

CPOATA Stu Walters joined the Fleet Air Arm Safety Cell (FAASC) on 17 Jan 11 as the new AFASO. Stu has replaced CPOATV Chris Nightingale who has been posted to Canberra for duties with the MRH90 project. The FAASC staff would like to thank Chris for his positive contribution to aviation safety over the past three years. Good luck with your future endeavours Chris.

In January 1982 Stu Walters joined the RAN as a Junior Recruit. After spending nine months at HMAS *Leeuwin*, Stu was posted to HMAS *Albatross* as a SMNATA. On completion of Phase One training, Stu was posted to 723SQN A Flight, which at the time flew and maintained Westland Wessex MK31B. During his four years maintaining Wessex, Stu was posted to the reformed 816SQN. In 1986, he was selected for the Phase Two ATA course. On completion of the course, he was posted back to 723SQN and joined the HS748 EWFLT. Stu spent the next two-and-half years maintaining the HS748 combined many deployments around Australia and South East Asia.

1990 saw him post to the Aircraft Support Unit. This posting involved manufacturing and repairing aircraft pipes and cables as well as servicing wheels and brake units. In 1991 he posted back to 723SQN. During this posting, Stu maintained the HS748 and deployed with the AS350BA in HMAS *Sydney* (DAMASK 7) and HMAS *Newcastle*. From 1995 to 2000, Stu again maintained the HS748 until the aircraft were decommissioned.

On Promotion to Petty Officer, Stu was posted to FAEU where he conducted Programmed Aircraft Surveys, Pre-Embarkation Inspections and Squadron audits.

On returned to 723 Squadron in 2003 he served in a number of positions before promotion to CPO. On being authorised as a Flight Senior Maintenance Sailor (FSMS), Stu managed several land detachments and deployed in HMAS *Warramunga* and HMAS *Manoora*. The last 18 months of his Squadron posting was spent employed as the Squadron Quality Manager.

Over the past three years, Stu has had postings as Career Manager for ATA/IS at DSCM and as Senior Instructor for SK50/AS350BA training at TA-AVN.

Stu can be contacted on (02) 4424 1251 or email stuart.walters@defence.gov.au

Bravo Zulu

ABATA R Marshall
816 Squadron

In Jul 10, Flight 3 received aircraft N24-003 (Tiger 72) for use during HMAS *Melbourne's* Mission Readiness Workup. On an aircraft not previously inspected by this maintenance team, ABATA Marshall identified a small Foreign Object (FO) underneath the mixing unit during an After Flight Inspection.

The FO was a blanking cap that had not been sighted during previous inspections and it was probable that it had laid dormant there for some time.

The circumstances in which ABATA Marshall sighted the FOD were not at all conducive to inspections; the position of the small object was hard to see, the hangar was dark and the ship was experiencing significant motion at the time. ABATA Marshall's diligence and attention to detail while conducting routine inspections in arduous conditions is commendable.

BZ ABATA Marshall

Bravo Zulu

LEUT S R Gutterson, RAN
HMAS *Stuart*

On the 18 Nov 10, LEUT Gutterson was acting as the Landing Signals Officer (LSO) for a VBSS (Visit, Board, Search and Seize) sortie in support of HMAS *Stuart's* Mission Readiness (MR) Workup.

With the aircraft manned and feverish activity occurring on the flight deck, LEUT Gutterson spotted three of the four dzus fasteners on the number five Tail Rotor Drive Shaft (TRDS) cover were not secured. LEUT Gutterson immediately informed the Aircraft Captain over telebrief. The fasteners were secured and the Aircraft's remaining panels checked for security prior to launch.

Was it not for his exceptional situational awareness and attention to detail, Tiger 75 may have been seriously damaged or even lost due to the panel's proximity to the tail rotor. An incident of this magnitude would have severely hindered *Stuart's* preparations for its operational deployment and impacted the wider management of the S-70B-2 fleet.

LEUT Gutterson is to be highly commended for his professionalism and diligence during an intense period. His performance is a credit to himself, *Stuart* and the Fleet Air Arm.

BZ LEUT Gutterson

ABATA M Skillicorn
816 Squadron

On the 02 Feb 11, during a routine Before Flight Inspection (BFI) of the transition section (internal dark confined space for avionics equipment in the Seahawk), ABATA Skillicorns' diligence and attention to detail identified severe chafing of the port side auxiliary fuel shut off valve to the rear of the kevlar fuel cell layer. This was despite it being hidden behind various avionics equipment. In addition to identifying the hidden chafing, and raising the incident with his supervisor, he also investigated the cause of the chafing, finding it to be an incorrect alignment (one radial bolt rotation) of the breakaway valve that is mounted through the aircraft skin.

Had this chafing gone unchecked, it had the potential to wear through the kevlar to the fuel bladder and cause possible damage to the fuel bladder, AB Skillicorn's actions prevented a costly and difficult fuel-bladder replacement. The aircraft flight was cancelled and a phase servicing was initiated early.

BZ ABATA Skillicorn

Bravo Zulu

POATA D Dillon
NU Squadron 808

During an early watch at NUSQN 808 in Jan 11, POATA Dillon, a newly promoted and under training Maintenance Manager (MM), was clearing A40-011 (MRH90) for a load lifting sortie.

In addition to the normal FSI responsibilities the MM is to also calculate K-Factors (K-Factors apply accelerated hours against specified maintenance-managed items (MMIs), due to the use of the cargo hook, hoist or an all up weight in excess of 10,600 kgs). These accelerated hours are calculated for the predetermined MMIs.

Once this is completed the MM can then carry out a MAINTFOR using those hours to ensure no programmed maintenance will be over flown.

While carrying out the K-Factor calculation to meet the intended hoist/hook operation for that sortie, PO Dillon discovered an error with the maintenance policy applied to the MMIs.

While checking identical MMIs he noticed that the policies are different in that one MMI showed only AFHRS as an event where the other had AFHRS and KFHRS.

This was then brought to the attention of his supervisors and the AMCO staff to investigate. Investigation by AMCO staff revealed that the incorporation of the maintenance policy MPAN back in Jan 10 had not been incorporated to all intended MMIs.

Although the identification of maintenance policy is not out of the scope of using CAMM2 when checking hours available, POATA Dillon's professional conduct, commitment to the task at hand as well as his attention to detail is commendable, his conduct is in the true spirit of the Navy's values.

BZ POATA Dillon

LSA K Boer
HMAS Stuart

During an evening pre-flight inspection of the Seahawk N24-006(875), deployed to the MEAO in HMAS *Stuart*, LSA Boer identified one of the four Tail Rotor Blade (TRB) De-Icing harnesses had detached at the position where the harness enters the TRB De-Icing connector.

LS Boer informed the Aircraft Captain and the aircraft was placed unserviceable. LSA Boer's attention to detail in identifying a break in a black coloured harness, at night in the challenging environment that is the flight deck, prevented any secondary damage being sustained to the TRB and stabiliser system. Maintenance staff were able to quickly rectify the fault and return the aircraft to service supporting Combined Maritime Forces (CMF) through Combined Task Force (CTF) 150 and CTF 151 in minimum time.

BZ LSA Boer

he had let our team down and nearly killed us. Considering how much of a 'Chicken-Little' I was and still am, I was relatively calm about the whole thing. All I remember saying was, "I'm pretty sure you won't make that mistake again."

Sometimes, when things do not go the way they are supposed to go in aviation, we fall into the familiar trap of the ABCs. No, I don't mean *accurate*, *bold*, and *concise* as we say in our Coast Guard Crew Resource Management training. I mean assign blame, begin bickering, and conceal the truth. In retrospect, the truth of the matter is that we, the pilots, did not set up our LCPL for success with his tool-control program.

Immediately before our flight, in the middle of our maintenance evolution on the deck of the TARAWA, the Air Boss ordered us to move quickly to make room for a Harrier jet launch. To move as quickly as possible, the other pilot and I made the mistake of rushing our maintainers to finish their adjustments on the rotor head.

Although prior to our flight we pilots specifically asked the maintainers if they had all their tools accounted for, we should have also insisted that they take their normal amount of time to complete their routine tasks. We could have done this by either delaying our entire maintenance evolution until after the Harrier launch, towing the aircraft clear of the Harrier launch to the forward slash, or by specifically asking our maintainers to take their time when we were asked to move.

Any student of Reason's *Swiss Cheese* model knows that mishaps are almost always the product of a chain of errors at the organisational, supervisory, or operator levels. By rushing our team at the supervisory level, we created, or at least permitted, the preconditions for the unsafe acts by our team.

I'm sure you are aware of this, but it's worth repeating: any time you rush an aviation task, whether in flight or on the ground, the probability of introducing human error increases exponentially. If you feel pressure that you need to rush a task due to exigent circumstances, make a conscious decision, based on a methodical analysis of the situation, to accept greater risk.

LT JASON GELFAND — BIO

LT Gelfand served in the U.S. Marine Corps from 1994-2003. He flew the UH-1N in the fleet (~1000 hours) and later taught flight school in the TH-57B/C (~1000 hours). He completed the U.S. Navy's Aviation Safety Officer course in 1999.

Since 2003 LT Gelfand has been with the U.S. Coast Guard and has over 2100 hours in the H-65A/B/C/D. He is currently an H-65 instructor at the U.S. Coast Guard Aviation Training Center. And for the past 2 years, has been a guest lecturer at the U.S. Navy School of Aviation Safety, where he lead a seminar about command climate. This summer he will transfer to U.S. Coast Guard Air Station North Bend, Oregon. The Fleet Aviation Safety Cell (FASC) welcomes LT Gelfand's article to this edition of TOUCHDOWN April 2011.

BY LT JASON GELFAND
U. S. COAST GUARD

Tool Academy

To move as quickly as possible, the other pilot and I made the mistake of rushing our maintainers…

There are sounds that can cause visceral reactions: a newborn's first cry; tyres screeching followed by the sound of impact. A loud metallic thunk from somewhere around the rotor head while you are flying over the middle of the big blue ocean may also cause a visceral reaction. It certainly had that effect on some friends and me about 10 years ago during a Marine Corps WESTPAC deployment.

When we heard that sickening noise, there was a pregnant pause before anyone spoke among our UH-1N Huey crew of four.

I asked, "Hey, are you guys sure that you have all of the tools accounted for?".

There was an even longer pause as our two crew chiefs, a sergeant and a lance corporal Kilo, made another check of the tools aboard the aircraft as we orbited in the starboard delta pattern.

"We're missing a wrench."

Another pause followed. After we connected the dot about our safety of flight problem, we called the air boss and coordinated a landing aboard mother as soon as possible. Once on deck, we shut down and slashed (towed clear of the helo spots) the aircraft.

The crew chiefs quickly spotted the problem. A large wrench, the kind used to make major adjustments on a Bell Helicopter rotor head, was found on the upper deck, resting against the inside of one of the upper cowlings.

Although a solid chunk of steel, the wrench had a large gouge in it: a witness mark from impact damage. With more inspection, the crew chiefs found another witness mark, this one on the supershaft, near the input to the transmission from the combining gear box. By luck, this witness mark was near the mounting bolts on the input spline instead of along the supershaft, a hollow metal cylinder.

Had the wrench struck the supershaft, which was turning at about 6000 rpm, the wrench could have easily acted as a cutting tool on a lathe. With the shaft severed, we would have been forced to autorotate into the sea.

After the post-flight inspection, the LCPL crew chief was visibly shaken, with tears in his eyes. He knew he had left the tool on the head. He felt as though

Aviation Safety in a Sister Organisation – an RAN Contribution (PART TWO)

BY LEUT M LYNCH, RAN

Our rescue swimmer (RS) conducted an assessment of the patient's condition, gathering her vital statistics so we could pass them to the senior medical chief (SMC) who would then inform the hospital so they were prepared when we arrived.

The transit was initially at low level under the overcast until we approached the coast where the cloud cover began to break, we climbed and not long after reaching the coast the skies were clear with unrestricted visibility.

Under NVG's I could see the city of Portland clearly and all of the commercial traffic arriving and departing from Portland International Airport. I contacted Portland Approach and negotiated priority handling to get our patient to the hospital. I made an approach to the hospital pad on top of the 15 storey hospital; the staff came out to meet us and took the patient from us.

We lifted from the hospital pad, and flew northwest to clear Portland airspace. Once clear we contacted Seattle Center and negotiated an IFR clearance for the RTB to the AirSta Astoria. We landed from the ILS 26 approach at Astoria after 3.2 hours of flight, 2.3 of which was under NVGs. We were later notified that our patient was in a stable condition and was doing well.

Five days later on 19 July I had duty again. At approximately 5am the following day, communications watch-standers at the AirSta picked up an EPIRB transmission and a broken MAYDAY on marine channel 16. The SAR alarm sounded and once again, after a quick check of the prevailing weather conditions, we made our way to the aircraft.

During the start, we were passed some more information. The vessel in distress was a 34' Fishing Vessel (FV) that was taking on water, there was a 55-year-old male on board and he had a life raft but no immersion suit. The position of the vessel was close, only 30nm away from the AirSta. With this information, I decided that we would be able to deal with the situation without requiring any further equipment to be bought to the aircraft.

During the brief transit, we discussed our planned course of action. I decided we would lower our de-watering pump to the vessel to attempt to arrest the flooding. In addition, should the sole occupant of the FV require assistance with the pump, we'd lower our RS. Just before arriving on scene, we were made aware that there was a good Samaritan responding to the MAYDAY. The good Samaritan was another FV that reported the sole occupant of the vessel in distress was now in the life raft and was hanging onto the stern of the stricken vessel.

We spotted the vessel and flew directly over the top at 300'. The stern of the vessel was completely awash and I knew immediately that we would not be deploying the de-watering pump. I directed my CP (right seat) to pull into an 80' hover into wind, advised the RS to prepare for deployment and asked the flight maintainer (FM) to

Compliance versus Safety or are they the same thing?

BY CAPT D REILLY,RAN

We have an obligation (legal and moral) to be vigilant and actively seek out what else may adversely affect safety during the course of the endeavour

Surely if one is compliant with the operational and technical airworthiness regulations, one is safe? We would all like to think that is the case; isn't that what underpins why we need to be compliant?

The Sea King BOI in concluding on the veracity of the Navy's Safety System made this somewhat controversial statement:

"Ultimately, the achievement of airworthiness compliancy did not ensure safety...."

What this says is that just because you follow the rules, it doesn't mean you are ensuring safety. A little surprising perhaps especially when it would be correct to assume the corollary is true – *if you are not compliant you are not likely to ensure safety*. Confused? Well it does need some thought.

Firstly, safety is about minimising the adverse affects of a hazard. Hazards only arise when humans put themselves and/or their equipment into a hazardous environment.

The appetite for acceptance of the risk arising depends subjectively on the human endeavour. The aim of course is to employ mitigation that will eliminate or at least move perceived risk to as low as reasonably practicable (the ALARP principle). (Note use of the term *practicable*, as opposed to the intuitive *possible*, otherwise an aircraft would never fly.) This approach provides wide scope for subjective assessment often resulting in variation between assessors; nevertheless, it does recognise the reality of human endeavour which is always a balance between operational intent, materiel support and in many cases, dollars.

In an effort to remove some of this subjectivity, the rules we are called to comply with (in our case, maintenance and operational regulations et al) are written to ensure that known and generally routine or conceived encounters with hazards are minimised or eliminated. When such encounters do occur, compliance almost always eliminates subjectivity and variation. Underpinning the development of these rules, is the fact they leverage off design and operational analysis processes that also endeavour to remove or minimise risk (eg. operational and design standards).

To arrive at such rules, hazards need to be identified (often gathered by experience), or conceived (risk analysis in design or operation). These risks are assessed then considered against the likely operational requirement with the rules written to meet the appetite for risk that the circumstances dictate, ultimately resulting in acceptance of residual risk by defining it ALARP.

At the very least, such rules, and our mandated compliance, assume the residual risk after mitigation will be acceptable. This is a pretty big assumption because defining ALARP is not only subjective but is based on 'perceived risk', when we would all acknowledge that in almost all situations there are additional unknown risks. Add to this uncertainty, is the elastic nature of ALARP as the operational pressures change. For instance, quite legitimately, considerable variation to defining ALARP will arise in circumstances where lives are at stake.

Furthermore, and this is what the BOI was getting at, although compliance is essential it does not exclude the possibility of variation to known or envisaged circumstances. That is, there may be risks that need recognition outside those accounted for by compliancy. We have an obligation (legal and moral) to be vigilant and actively seek out what else may adversely affect safety during the course of the endeavour. Complacency is the threat here. As employees or as supervisors we not only need to recognise compliance is the foundation stone to providing a safe outcome (and need to comply) but we cannot complacently assume our obligation to provide a safe environment for ourselves and our colleagues ends with simply following the rules.

May I therefore proffer in simple conclusion that along with compliance; vigilance and forethought are the missing elements inferred by the BOI as being required to ensure safety.

the woman and her unborn child. We departed the scene immediately and made our way to the designated drop-off location. During the transit, I could hear the patient screaming over the sounds of the helicopter, partly due to her condition and possibly due in part to being excited. Otherwise, the transit was uneventful. We were to later learn that mother and baby were doing fine.

Later that day, at 1.52pm the SAR alarm sounded again. The report was a cliff-fall victim only six miles from the AirSta. I didn't have a good feeling on this one. I knew the area well and had flown on a similar case in the vicinity a couple of years ago. On that occasion the subject of the SAR case expired. I should mention also the pilots at our AirSta hold a vertical surface recue qualification. We regularly conduct hoist training with the RS's rescuing mannequins that have been placed on cliff faces on the coastline.

I elected to take the right seat on this case as I knew it would be challenging, and if we were going to be close to cliffs, trees and other obstructions, I wanted to be doing the winching since my CP had not really had a great deal of exposure to this type of rescue. The start, taxi, take-off and transit were uneventful. We arrived on scene and immediately located our patient. There were two people already in attendance. One man had donned a wetsuit and swam about 1200 meters to the location to render assistance; the other was a member of a cliff-rescue team.

We prepared to deploy our RS to the location to assess the patient and advise the best method of recovery. Due to the location of the patient, at the bottom of a 200' cliff on rocks adjacent to the surf, I didn't have a whole lot of options for the position of the helicopter to conduct the RS deployment, or indeed the ensuing recoveries of the RS and patient. I was going to have to conduct the winches from 200' to be directly over the survivor's location.

I deployed the RS and backed off so he could conduct the assessment. I directed the FM to prepare the Stokes litter in anticipation of spinal injuries. The RS contacted us by radio with the patient's condition. He was a 17-year-old male, with a suspected broken right arm, broken left leg, significant facial trauma and cranial lacerations. Despite this, our patient was alert and in good spirits. The RS requested us to lower the Stokes litter which we did. It took about 10 minutes to prepare the patient for recovery, which we completed, followed by the recovery of the RS.

We departed the scene and returned to the AirSta to be met by paramedics who transferred the patient to the local hospital. The patient was eventually transferred to a hospital in Portland for surgery. He returned to the AirSta a couple of weeks later with a television crew to meet us and express his thanks for rescuing him.

So, as you can see, it was a busy 11 days for me personally. Thankfully all of these cases had positive outcomes. During my time with the USCG I've flown on a lot of SAR and MEDEVAC cases. They have included logging accidents, vessel fires, vessels taking on water, vessels sinking, cliff-fall victims, heart attacks, strokes, accidents on commercial fishing vessels, people swept out to sea and flare sightings to name just a few. On many occasions, unfortunately, the rescue part of SAR has become a recovery. This can be difficult to deal with, knowing that your best efforts have failed to save someone. The upside is the feeling of having been a part of saving someone who would not have otherwise been alive.

These cases required a high level of aviation professionalism from all crew members; knowledge of the aircraft and systems, procedures, aircraft limitations, weather, crew resource management and operational risk management to name but a few. Every duty and every case is different. The level of training I received in Australia is second to none. It laid a solid aviation foundation that I was able to build upon here in the USCG. It has allowed me and my crews to prosecute the mission safely, effectively and efficiently, ultimately assisting many people and saving some lives. I look forward to returning to the FAA and sharing these experiences and

The upside is the feeling of having been a part of saving someone who would not have otherwise been alive

LEUT Lynch's narration of an event mentioned in this two-part series was voted as a 2010 Coast Guard Video of the Year, as one of the Coast Guard Top 11 videos of the year and is now in the running to be selected as one of the top three contestants for video of the year 2010. See his narration at http://coastguard.dodlive.mil/index.php/2010/12/day-8-coast-guard-video-of-the-year-2/

LEUT Lynch is awarded a $200 cash prize for his article sumission to TOUCHDOWN magazine. Congratulations.

commence recording with our hand-held video camera. Only 40 seconds after he began recording, the subject of the SAR case slipped below the waves. My consideration now was that our survivor had been in the water, and given his age and exposure, from a medical standpoint, it would be better to winch him rather than ask the good Samaritan to recover our survivor and return to port.

I decided to deploy the RS to assess the survivor and determine the best method of recovery. The RS swam to the life raft and confirmed over the radio that the survivor was wet, possibly hypothermic, and would require winching. We recovered the survivor directly from the life raft using the rescue basket followed by the recovery of our swimmer.

We transitioned to forward flight and returned to the AirSta. We were met by a waiting ambulance and the survivor was taken to the local hospital. After we shut down and debriefed, we opened the large box that had come up with the survivor; it was his saxophone; he returned to the AirSta a few days later to claim his prize possession.

Sunday 25 July was a typically beautiful summer day in Astoria. I had duty that day and my CP was a relatively new pilot who had been at the AirSta for about six months. He had not at this stage completed an operational winch on a SAR or MEDEVAC case. I had decided that if we got a case off shore during the day, I would let him take the right seat. At 1055 am the SAR alarm sounded, announcing there was a woman in labor on a FV off shore to the northwest of Astoria.

On the transit to the location, some 60nm away, we were informed that the patient was a 25YO woman, eight months pregnant with contractions three minutes apart, she was on heart medication and was vomiting due to sea sickness. As well as launching the helicopter, the SMC launched a USCG 47' MLB (motor life boat) from Station Grays Harbour. The MLB was somewhat closer than we were and would arrive on scene at the same time as us. Once we got over the ocean we encountered a 300' thick layer of sea fog, typical for this area and time of year. It now looked like we would end up having to conduct an instrument approach to the water since we couldn't make visual contact with the surface.

The SMC notified us that winching of the patient was advised and also which hospital we were to take the patient to. To mitigate the risk of winching from a sports fishing boat, I tasked the 47' MLB to come along side and retrieve the patient. We regularly conduct 'underway' and 'dead in the water' winching by both day and night with the 47'MLB stations, it would make sense to work with a crew that was experienced working with a helicopter. We were able to locate the vessels on radar, and a few miles out the sea fog began to dissipate. We made our approach to the water. We conducted a vessel brief and retrieved the patient from the 47'MLB underway using the rescue basket. I denied the husband's request to be winched to accompany his wife, as this was neither authorised nor did it make sense to further delay and risk the health of

... we opened the large box that had come up with the survivor; it was his saxophone; he returned to the AirSta a few days later to claim his prize possession

Springs, then Adelaide (both to refuel); and then back to Edinburgh to overnight. Day two was from Edinburgh to Nowra. Planned altitude was between 7000 and 9500 feet.

The first leg was uneventful (with the assistance of the "burnt-out bus" navigation fix halfway between Fitzroy Crossing and Alice); as was the refuelling in Alice. Leg two; Alice to Adelaide tracking via Leigh Creek; just past Lake Eyre. Suddenly my eyes were drawn to the Air Speed Indicator (ASI).

It was slowly moving anti-clockwise through about 125 knots, down from a cruise speed of high one thirties. When I indicated the problem to the pilot (probably with expletives) he responded: "That's okay, mine is………"… his voice drifted away. Sure enough; his ASI had just started to wind back too.

Aviate! Navigate! Communicate!

We quickly reviewed our situation. We were in level, stable flight in Visual Meteorological Conditions (VMC) conditions. Power settings were standard and the Automatic Flying Control System (AFCS), one of the best in the fleet, was engaged and operating normally. We left everything as is. I quickly picked up the post-start error. The Broome, rather than standard checklist, and we had flown near wispy clouds about 15 minutes previously. Pitot heat was subsequently switched on.

By now the ASIs sat on zero. We had no real choice other than wait it out.

After a few tense minutes, with two pairs of eyes constantly checking the attitude (particularly outside) and the engine instruments, the ASIs started to slowly climb back up towards the correct speed.

That is what happened. How and why? Why did it not happen 11 days earlier on my previous Broome to Nowra ferry flight?

In the previous 60 days, 11 of my 24 Tracker flights had originated in Nowra or other cool climes so "Broomeitis", that is, lack of my recent use of the NATOPS Checklist, did not explain the omission. Certainly the pilot on the first flight was a lot more experienced than the pilot at the time of the incident; however, the second pilot had (based on normal detachment cycles) flown regularly in both Nowra and Broome in the previous 60 days.

The most likely cause was the lack of concentration by the crew on the first day of flying after about four days off in a very relaxed environment. A contributory cause on the first leg was the distraction of ensuring we had "turned off the lights, and locked the doors" on completion of the final departure of "VC851 Det Broome". Did we turn pitot heat on for the first leg? I can't recall. But if we had not, this "habit" most likely rolled into the second leg.

The certainty is that the outcome could have been dramatically worse in less benign weather conditions.

LCDR Dolan is awarded a $50 cash prize for his article submission to TOUCHDOWN magazine. Congratulations.

BY LCDR J DOLAN,RAN
HQFAA

Aviate! Navigate! Communicate!

When I indicated the problem to the pilot (probably with expletives) he responded: “That’s okay, mine is ....” ... his voice drifted away.

In the mid-70s the RAN S-2E Trackers were tasked with conducting fisheries surveillance from Broome on behalf of the WA Department of Fisheries. While based out of Broome there were two changes made to the aircraft NATOPS (Naval Air Training and Operating Procedures Standardisation) procedures.

The first (although not related to the incident to be described) was an increase to nose-wheel lift off speed. Patrols were conducted daily departing about 0630, and the prevailing east wind at that time dictated that take off was over the then northern end of the town, known as Chinatown. Squadron pilots including a test pilot (TP) on the early detachments calculated that if an engine failure occurred shortly after takeoff, and the undercarriage failed to retract, the resulting climb rate of about minus (-) 600 ft/min would have the aircraft crashlanding in the middle of Chinatown.

Instead of lifting the nose-wheel off at the normal 90 knots, lift-off speed was increased to the nose-wheel limit of 115 knots. It was calculated that then in the event of all things going wrong we would join the crocodiles in Roebuck Bay.

The second variation to procedures was that the pitot heat was not automatically turned on in accordance with the standard NATOPS checklist. This change resulted from some missions being aborted due to “burning smells” that were determined to be caused by the pitot heating element overheating in the warmer clime.

The pre-flight briefing was changed to cover the revised lift off speed, while an amended aircraft cockpit checklist was produced by the squadron to cover the pitot heat.

So where is this leading?

The detachment for the year had ended, but on departure of the remainder of the detachment four days earlier the aircraft had suffered an engine cylinder failure on take off. A pilot, myself (seconded from the HS748 support aircraft crew), and two maintainers were left behind with the broken aircraft.

Courtesy of a C-130, spares had arrived, the aircraft was fixed and for the second time in two weeks I was on a Tracker ferry flight from Broome to Nowra. The planned route was Broome to Alice

BY ROBERT FORSTERLEE
SOAVN PSYCH

Our culture reflects our performance

As a means of assessing and managing system-induced and individual errors, an annual Safety Survey has been conducted by the Fleet Air Arm Safety Cell (FASC) since 2005. The drive for this yearly self-examination was due to a convergence of several factors. There had been the loss of life in the Shark 02 accident, along with the increasing evidence that safety attitudes influence subsequent workplace behaviour (see Brown, Willis, & Prussia, 2000; Fogarty & Shaw, 2003; Nahrgang, Morgeson, & Hofmann, 2011; Probst & Brubaker, 2001).

In particular, Fogarty and Shaw had shown that, within an Australian Defence Force environment, group norms, management approaches to safety, personal safety behaviours, and workplace pressure were associated with increased negative work intentions and practices such as violating procedures. While their research focused on the link between work climate and particular types of workplace behaviours that are intentional but unsafe, the present analyses focus on errors – or unintended outcomes caused by slips, lapses ,and mistakes made by individuals (Reason, 1990).

The focus on safety attitudes within the maintenance workforce is to assess potential benefits of developing safety oriented intentions through cultural initiatives. In theory, these intentions – become habit if practiced with regularity and seen as contributing positively to workplace safety and performance. As we all know, once habits are established they become automatic, reflexive behaviours (such as saying "thank you" on the conclusion of a purchase). Unfortunately, habits, good or bad are unconsciously performed, which is why things often do not go as we initially plan.

Figure 1 shows four factors of interest (Organisational Safety, Unsafe Group Norms, Unsafe Behaviour, and Perceived Pressure that comprise the Aviation Safety Attitudes Survey.

Given the literature, the factors derived from the survey would be expected to be predictive of reported rates of errors among the maintenance work force. Previously, fatigue has been shown to impact work performance within the RAN. That is, earlier TOUCHDOWN issues have reported on the increased rate and length of operations, along with heightened operational tempo within the Squadrons as influencing the level of fatigue of maintainers and how this impacted on the rates of error reported.

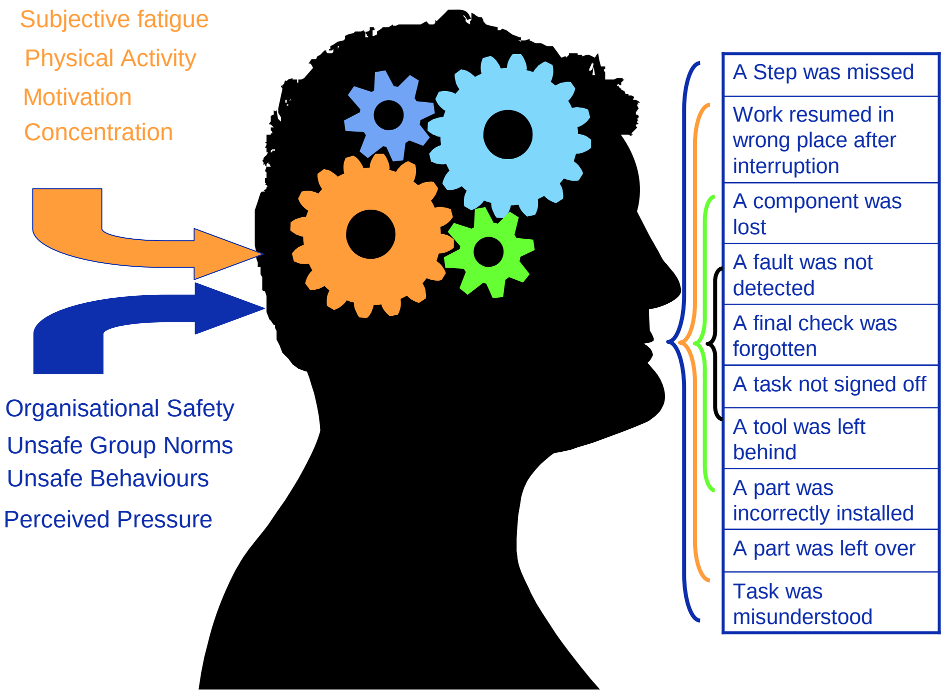


FIGURE 1: Fatigue and Attitudinal Factors influencing Error Rates

The results of analyses of the recent survey show support for the findings reported in the literature. That is, while Organisational Safety attitudes and Unsafe Group Norms contributed to the prediction of all or nearly all of the 10 reported error types. The findings show that "outside influences" become internalised within the individual and can either foster or hinder one's work performance. Further, the subtypes of Fatigue demonstrate that even at sub-clinical levels, self-reported Fatigue influences the frequency of errors. Interestingly, the perception that pressures in the workplace promote most errors was not demonstrated as Perceived Pressure was only found to contribute to the error rates of not signing off on a task.

To TCAS or not to TCAS?

LEUT L SHERWIN, RAN

Background

During the MRH90 suspension of flying operations in 2010 as reported in TOUCHDOWN April 2010, I had the privilege of spending two weeks on the Gold Coast for an EC135 endorsement. One piece of equipment I was impressed to see fitted to the EC135, but surprisingly not fitted to the MRH90, was a Traffic Alert and Collision Avoidance System (TCAS).

After initially relying on the MK1 eyeball and ATC for my situational awareness (SA) of other traffic, I gradually expanded my workcycle to incorporate the TCAS traffic display fitted to the aircraft. This enabled me to develop and maintain SA on traffic beyond visual range, irrespective of whether or not ATC had passed information on the traffic.

It was during this endorsement training that it occurred to me that a civilian operator with far less training (and in a smaller and cheaper aircraft) than a military operator could easily surpass us for SA on traffic. TCAS I, the version most commonly in use with general aviation (GA), can detect traffic at ranges up to 40 nm. E-TCAS, which offers military modes to enable formation flying, conforms to TCAS I when used in normal mode. It provides an aural alert of *'traffic, traffic'*, but no resolution advisory.

TCAS II provides a resolution advisory and is mandated in Australia as of 01 January 2000 for turbine-powered commercial aircraft with >30 seats or >15,000 kg (CASA, 2010). With capability comes cost, of course, with prices ranging between $25,000 and $150,000 per unit depending on manufacturer, model and version ("Traffic collision avoidance system", 2011).

ABOVE Aeroméxico Flight 498 falling to the ground immediately after collision. Note the missing horizontal stabilizer.

The catalyst

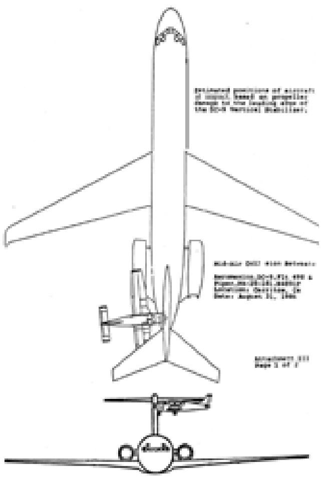
Automated airborne collision avoidance has been under development since the 1950s, but it took a mid-air collision over a populated area in the Los Angeles airspace for the US FAA to issue a Notice of Proposed Rule-Making (Mellone, 1993). The following information is from the NTSB report, NTSB/AAR-87/07:

On 31 August, 1986, Aeronaves de Mexico, Flight 498, a DC-9 on an IFR flight plan from Tijuana, Mexico to LAX collided with a VFR Piper PA-28. The DC-9 was on descent under terminal radar control in visual conditions (>15 nm visibility) and the Piper had wandered into the airspace without a clearance. The Piper was not fitted with mode Charlie transponder (however was squawking 1200) and was not identified by the controller, who was dealing with another aircraft that had also inadvertently entered the terminal airspace when the collision occurred.

The Piper struck the tail section of the DC-9 causing catastrophic damage to both aircraft. All 64 persons onboard the DC-9 and 3 onboard the Piper were killed along with 15 persons on the ground. A further 8 persons on the ground were injured.

The NTSB (1987) determined the probable cause of the

ABOVE Aerial view of the crash site.



ABOVE Approximate point of impact.

ABOVE TCAS Display (Mellone, 1993) .

accident to be the limitations of the ATC system to provide collision protection, through both ATC procedures and automated redundancy. The contributing factors were (1) the inadvertent and unauthorized entry of the PA-28 into the Los Angeles terminal control area and (2) the limitations of the "see and avoid" concept to ensure traffic separation under the conditions of the conflict (NTSB, 1987).

A jury ruled the Aeroméxico flight bore no fault, instead deciding the pilot of the PA-28 and the FAA (ATC) each acted negligently and had equal responsibility ("Aeroméxico Flight 498", 2011). As a result of this accident and other near mid-air collisions the US FAA mandated TCAS II for US commercial aircraft with >30 seats or >33,000 lbs MTOW and TCAS I for aircraft with >10, but <31 seats as of 01 January 1993 (Mellone, 1993).

Human factors

Two human factors (HF) issues associated with a visual scan are signal detection theory (SDT) and the vigilance decrement. Signal detection performance is the ability of our information processing to discriminate a target (signal) amongst the noise our senses are continually receiving (Wickens et al, 2004). Think of this as the difference between the information our senses receive and what our minds perceive. A miss occurs when we fail to detect a target, that is actually there, from amongst the background noise. This is a common occurrence when there is a low signal to noise ratio, such as looking out for a grey military aircraft against a grey sky or a small white GA plane against suburban rooftops. Conversely, a hit is the correct detection of a target from amongst the background noise.

The vigilance decrement is the reduction in signal detection performance during a task requiring target (signal) detection, such as looking out for traffic. Contributing factors to the vigilance decrement are:

- Increasing task duration,
- Low signal to noise ratio,
- Low signal frequency, and
- Low arousal level (Wickens et al, 2004).

Under these conditions our minds subconsciously raise the threshold for discriminating signals from noise and degrade our saccadic eye movements (visual search) (Wickens et al., 2004). Therefore, lookout and traffic detection is subject to human performance variability, and all the associated fallibilities. Consequently TCAS was developed, not to substitute for the lookout in airmanship, but to mitigate the risk of mid-air collision through enhanced SA in order to improve aviation system safety. Flying around with your own little traffic display offers a significant improvement to crew SA, and can counter the vigilance decrement with both visual and aural alerts.

The design of a typical TCAS display should ideally maximise the signal to noise ratio by highlighting the traffic and reducing background clutter as in the picture below, however for practical reasons it is generally integrated into an existing display, such as a weather radar. The auditory alert is provided to improve signal detection performance through 'coupling', which is the arrangement of a task so as to ensure signals get into the appropriate sensory input of the operator (Elliot, as cited in Davies & Tune, 1970). All other things being equal, auditory tasks are more tightly coupled than visual tasks, because our auditory system is omnidirectional; hence auditory warnings are in common use within aircraft safety systems such as 'bitching-betty', ground proximity warning, configuration and fire warnings, etc (Wickens et al., 2004; Elliot, as cited in Davies & Tune, 1970). Put simply, the equipment uses stimuli to improve the operator's extraction of information from the environment.

Some stats

The Massachusetts Institute of Technology (MIT) conducted a research project into the ability of pilots to sight other planes in flight during the 1980s. They conducted two tests; the first test was for an unalerted encounter and the second was for an alerted encounter using TCAS (NTSB, 1987). The approach of intruder aircraft was from head-on, at 90 degrees and 135 degrees, with 36 visual acquisitions from 64 unalerted encounters (56%) at a median distance of 0.99 nm (NTSB, 1987). For the alerted encounters, 57 visual acquisitions were achieved from 66 intruder aircraft (86%) at a median distance of 1.4 nm (NTSB, 1987). Considering these figures in isolation, it can be concluded that the probability of a hit (detecting the target) was greater with the use of TCAS in this experiment. And therefore the probability of a miss was greater when relying solely on lookout. The Human Error

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Think of a caption for the photo left and send it to navyairsafety@defence.gov.au
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"OK it's parked... can I have my forklift licence now!"

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BEST ARTICLE SUBMISSION – 2010

'When good weather turns bad'

Congratulations LEUT B SINCLAIR

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running the checklists, conducting communication checks and dealing with the ESM/RWR system load. These tasks were being conducted concurrently and in themselves were distractions to each other, but in particular, rectifying minor issues with the ESM/RWR system was proving a significant distraction to a TACCO new to the system. Needless to say, I felt I was 'behind the aircraft' and needed to get ahead. My situational awareness (SA) was reduced.

The aircraft captain's statement to the crew had been the first defence applied but, retrospectively, I had not applied it effectively. Further, I had not applied CRM lessons from previous embarked experience and my lack of recency compounded my ability to do so. It was during the conduct of the above tasks that more tangible defences also failed, the first being the 'takeoff checks'.

The challenge and response takeoff checks were being conducted concurrently with the other tasks and to put it simply, if a checklist item is not challenged it is likely there won't be a response. I had returned to the checks following the completion of a competing task and inadvertently missed arming the aircraft floats. None of the other crew recognised this omission.

The aircraft was subsequently lifted into the hover and the next defence failed. During the conduct of the hover checks, I declared that the caution/advisory panel was 'normal'. It certainly was normal for shore based operations, but we were lifting from a frigate at night off the coast of Sydney.

Whereas previously human error had led to the omission of a checklist item, reduced SA and a skill-based error (due to recent experience) led to the failure to recognise that the aircraft was not configured for overwater flight.

Had we experienced an incident, the subsequent BOI would have seen many people spending a long time trying to figure out why the aircraft had ditched without its floats armed or activated. Thankfully this did not occur. Following launch, and during the after-takeoff checks, an issue with the retraction of the RA probe diverted my attention to the lower console where I noticed that the floats were not armed. I immediately armed the floats. This was not verbalised due to the workload of the crew attempting to estblish communications with the ship to discuss the Rast Assist (RA) probe issue and I subsequently informed the aircraft captain when we landed at *Albatross*.

It is not lost on me the relative ease in which I found myself in this situation. It is also not lost on me the manner in which the problem was identified and I am unsure how long it would have been before I had noticed the issue in my cockpit scan. Doctrine dictates 10 minutes down track, but up until this point procedural checks had failed.

So what did I learn? Firstly, I had heard many times before during safety stand down days, crew room discussion and debriefs from instructors that if something is not feeling right, it probably isn't. Further, if you find yourself in a situation that you are uncomfortable with, speak up, utilise CRM and rectify

the issue. In this instance I recognised that I was behind the aircraft but believed it was within my ability to rectify, and so did not say anything. I did not appreciate the level of my reduced SA and the impact this would have on the crew. Also, I did not perceive a failure of the takeoff or hover checks, due to simple (albeit critical) errors.

What else did I learn? By analysing an incident or near miss (whether formally through an ASOR or not) and identifying the failed defences and causal factors you can ask yourself how it was that you were led into a certain situation and correct it on the next occurrence. Ideally, you want to learn from others, mistakes to prevent you having to make them yourself. So, fortify your mental processes through habit and SOP to reduce the effect of limited recency , utilise verbal CRM when completing challenge and response checks and you need to conduct a competing task (eg. "holding the checks at...") and if distractions are affecting your SA, annunciate this as you may not appreciate to what level. Even if you believe you have effective processes to deal with the above issues, as I did, you can always improve in some way.

The difficulty remains identifying the train wreck when you are on the train. Hopefully the lessons I learned from the above incident can help others to identify when they are in a similar situation and prevent being railroaded towards a safety breach.

By FASO:

LEUT Holmes speaks from experience. This is often quoted as being the best teacher. However we cannot afford to have all of us undertake the lessons taught by physical experience.
We need to learn from the experiences of others so that we don't make the same mistakes.

Identify the train wreck before it happens

LEUT I HOLMES, RAN

... led to the failure to recognise that the aircraft was not configured for overwater flight

We are all aware of the phrase, and I'm sure we have all witnessed a "trainwreck" of our own: that incident or event you can see playing out before your very eyes where the 'swiss cheese' is lining up, but are powerless to effect. The difficulty, of course, is recognising this when you are sitting on the train, since you may not be aware of the entire situation... but there are often clues.

I was the TACCO of Tiger 75, Flight 1, for a night Logistic (LOG) Helicopter (HELO) task from a RAN warship to HMAS *Albatross* at Nowra. The warship was off Sydney and the transit was along a familiar coastline to be conducted on Night Vision Googles (NVG). We expected some cloud, but nothing of concern and there was nothing particularly taxing or difficult identified in the sortie planning.

The crew, including myself, were current but our recency varied. The aircraft captain had been in the Flight for the recent shakedown and had been ashore only a few months following a previous deployment. We carried two SENSOs, one of which was in the same situation as the aircraft captain, and the other who had only recently joined the Flight after completion Operational Flight Training (OFT). I, on the other hand, had not embarked for the ship's shakedown as I was completing my NVG training. This was going to be my first embarked sortie in two years after my last seagoing posting. While I was not new to embarked operations, my recent experience was all shore based.

Becoming familiar with embarked flying preparations was not a concern for me, but the flight and ship in general were still working up to achieving the necessary launch timings. When we all strapped in it was obvious that we would not be off the deck on time. The aircraft captain stated the fact we would be off late and not to rush in order to try prevent the 'perceived pressure' that can often build in this situation. I remember mentally acknowledging and agreeing with this comment, but did not necessarily apply it to my mental processes at the time. Instead, I remained focussed on preparing the aircraft systems for launch, one side they looked at the autonomous systems that would be mounted on board the UAS to give the autopilot awareness of its surroundings ie. detect an approaching aircraft and adjust the UAS course to avoid a conflict situation. Systems like these are relatively common and can be seen at various UAS exhibitions around the globe. With the number of interested parties, it is not surprising to see the variety of solutions ranging from onboard radar to stereo cameras; able to see and recognise an aircraft several miles away. Most of them are capable of recognising and resolving a simple conflict scenario, but not many are capable of safely operating in the dynamic military environment. There are research projects looking into creating a global system which would monitor the movement of every aircraft in the world, recognise a potential collision, take control of the aircraft involved and divert them on to a safe flight path. This potential tracking system is not as much an element of science fiction as it might seem. Systems such as these are being tested today and it is only a matter of time before they enter the world of everyday flying.

Today, though, there is no accessible technical solution. The only way ahead for the foreseeable future is to operate the UAS procedurally under strict air traffic separation rules. Historically UAS novices (like ADF) have simply implemented a strict segregation "no other aircraft" policy, while the more experienced users such as USA and Israel use an altitude separation within the operational zone. But how much longer can we expect to rely on this method of airspace management with the UAS numbers growing as they are?

Sadly, as there isn't a regulatory framework established to govern UAS operations, it will be years before any of the technical systems above will be certified and approved as safe for service. So where does that leave us with all the solutions still years away and the UAS at our doorstep? The Australian Army have been operating UAS overseas for some years, and are looking to expand the scope of operations. The RAAF have been finding their way around the Herron UAS in theatre for the last two years and have commenced flying operations from Woomera in March of this year.

As it is only a matter of time before we see a grey UAS with "NAVY" written on its side, and until the UAS grow eyes and become able to avoid all potential collisions on their own, all we can do is check the NOTAMS and be mindful of their presence and the airspace they occupy, because even if you can see them, they still can't see you.

By FASO:

For future Naval operations involving UAS we will need to find ways to integrate rather than segregate. While a technical solution to the UAS sense (see) and avoid issue is in the wind, and there are VFR and IFR regulations – with UFR (Umanned Flight Rules) – in draft to combat the unintentional one-on-one meeting in the sky, procedures, vigilance, knowledge and clear communications remain our current best defence.

ABOVE Australian Heron in flight.

LEUT Stepchenkov is awarded a $100 cash prize for his article submission to TOUCHDOWN magazine. Congratulations.

world has a robust set of regulations (technical and/or operational) to govern the use of UAS, leaving us with nowhere to turn to for advice.

Australia is leading the world in the operational Regulatory aspect but the CAR 101 is dated. To understand the difficulties the operators and regulators face all over the world we must take a closer look at what makes UAS so special and why it is so difficult to fit into our current system.

The obvious reason – is the “unmanned” element of the system. However there is more to it than most people realise. Over the past 100 years we’ve learned pretty well how to operate aircraft with qualified people inside them.

Our operations and practises revolve around the aircrew who seek to guarantee the safety of flight for everyone inside and outside the aircraft. At the same time, having people on board immediately gives an aircraft crash the potential for catastrophic consequences. On the other hand, unconstrained by the same human factor, the UAS crash is usually an acceptable event (this of course is largely dependent on where the UAS will crash – a variable outside of the scope of this article). This simple fact allows the UAS to shed a number of redundancy and safety systems that are indispensable for a manned aircraft. It also allows for them to be relatively cheap, dispensable and ready for use in environments too hostile for a manned aircraft (recon above the battlefield, chemical fires, erupting volcanos), but at the same time notoriously difficult to integrate into a shared airspace.

A few years ago, while completing the avionics engineering degree at Queensland University of Technology (QUT) in Brisbane, I was fortunate enough to be involved with research conducted by the Australian Research Centre for Aerospace Automation (ARCAA). ARCAA was focusing on several projects to introduce new and novel uses for the UAS. A course-mate and I assembled various UAS and used them to fly different payloads to support the research projects at ARCAA. Most of the time the aircraft were operated from small airfields around Brisbane, abiding by CASA regulations, such as they are, and maintaining flight altitude below 400 ft. Even under these restrictions, there were a few interesting moments when light aircraft approached the airfields to land.

One of the ARCAA projects was a joint venture with DSTO and Boeing, investigating how manned and unmanned aircraft operations could be safely integrated. On

But how much longer can we expect to rely on this method of airspace management with the UAS numbers growing ...

BY LEUT D STEPCHENKOV, RAN

Blind in the sky

ABOVE Australian ScanEagle unmanned aerial vehicle.

About a year ago a ScanEagle Unmanned Aerial System (UAS), operated in Afghanistan by the Australian Army, was on approach to the landing site.

In accordance with the ScanEagle recovery program it was carrying out an orbit at the Final Approach Fix (FAF) altitude before recovery was cleared by tower. Two Mi-8 Helicopters were given clearance to descend into the circuit, with ATC cautioning them about UAS traffic. One of the Mi-8's descended directly into the UAS FAF orbit while the other descended into the approximate 'Abort to Hold' area of the UAS.

The ScanEagle ground personnel advised the UAS operator of the situation and recommended they move south approximately 1000ft to de-conflict between the two helicopters.

The advice to move orbit south 1000ft was not acted upon as the aircraft was at the FAF and any lateral movement had potential to cause impact with the terrain. The mission commander instructed the air vehicle operator to maintain position and immediately informed tower of the ground crews observations.

ATC responded advising the Mi-8 crews that they were operating in a UAS approach orbit and they were to depart the area immediately. After the helicopters departed the UAS was approved to recover.

This traffic confliction is just one among many that ADF has experienced over the last several years while operating UAS. In the last year alone there was a total of 13 ATC related ASORS for UAS.

This issue is a growing concern worldwide following the rise in the demand for UAS in civilian and military airspace, and yet we still have no firm solution in mind to tell us how to safely integrate UAS into the airspace with manned aircraft. To make matters more challenging, as of today no country in the

	APPROVED HELMET			
MISSION TYPE	Alpha 400	Gecko	Cranial	Kevlar
PASSENGER TRANSFER	Preferred	No	Minimum[1]	No
AME	Yes	No	No	No
SAR	Yes[2]	No	No	No
TROOP LIFT	Preferred	No	Minimum	Yes
HVBSS (FAST ROPING)	Yes	Yes[3]	No	No
DIVER DROP	No	No	No	No

Table 12–2: Head protection approved for passengers of Navy aircraft.

In order to use cranials in the passenger transfer scenario, the following note is included:

“An AVRM review must be completed for any passenger transfer using a cranial. Cranial helmets are only to be used for a passenger transfer as a last resort or when it is not practical for qualified personnel to fit Alpha 400, e.g. during a winch transfer from a non-air capable vessel. Cranial helmets must be worn with goggles.”

Therefore, although the cranials that were fitted were an approved helmet, the fact that there were Alpha 400s available and the Aircrewman was qualified to fit them meant that opting for the Cranials was in contravention of ABR 5150.

A factor in this decision may have also been that the only passenger flying the Aircrewman had been involved in with the squadron was a families day, where a formal risk-management plan had been conducted to allow the passengers to wear cranials.

With approximately five minutes before launch, the aircraft was rotors running on deck, and the co-pilot had been joined in the aircraft by the aircraft captain and observer. The aircrewman, having completed the passenger fittings and briefings, escorted the passengers into the flight deck. Having signalled for him to take them into the aircraft, the pilots began their challenge and response pre-takeoff checks. This meant that a large part of the pilot’s focus was in the cockpit, so neither of them registered that two of the passengers were in cranials, as they were walking in under the disk.

The pre-takeoff checks were completed as the aircrewman strapped the passengers into the aircraft. Once this was completed, the crew was back-briefed on the sortie requirements by the observer.

By this time, the crew were all aware of the pseudo time pressure that was being generated by the desire to prove their ability to launch inside the 30-minute timeframe.

Although things weren’t being rushed, the concurrent conduct of the pre-flight activities meant that there was a reduction in the level of supervision of each of these tasks, and therefore a reduction in levels of defence to prevent unsafe occurrences – compared to what would occur during the pre-flight preparations for a normal sortie.

None of the other crew noticed that the passengers were not all in Alpha 400 helmets, and the aircrewman, having assumed that flight in cranials was acceptable, did not brief the aircraft captain on the head protection being worn by the passengers.

The aircraft launched for its circuit, and landed on a couple of minutes later without incident. It wasn’t until the crew were exiting the aircraft after shutdown that the cranials were noticed, and the aircrewman queried about it.

After the incident, the aircrew took the opportunity to de-brief the sortie, in order to make sure that the valuable lessons to be gained from what had happened were emphasised. The main learning points that came out of the incident were:

- Simulated time constraints such as those imposed by the exercise have the ability to lead to real-life safety incidents.
- Make sure you have a comprehensive understanding of the regualtions. If you’re not sure, then pull the book out and have a look.
- Everyone in the crew needs to ensure that the aircraft captain is properly briefed about anything that is outside of the SOPs.
- Don’t assume.

Notes
1. An AVRM review must be completed for any passenger transfer using a cranial. Cranial helmets are only to be used for a passenger transfer as a last resort or when it is not practical for qualified personnel to fit Alpha 400, eg during a winch transfer from a non-air capable vessel. Cranial helmets must be worn with goggles.
2. See paragraph 12.16–12.17. ABR 5150
3. The Gecko helmet is the in-service fast roping / boarding party helmet and should be worn with hearing protection (ear plugs) and goggles.

BY LEUT S DRIESSEN, RAN

Understanding the publications

During 2010 HMAS *Kanimbla* was mid-way through a workup for a Unit Readiness Evaluation, and the ship's embarked flight was whilst at Alert 30, as another complex damage control exercise (DCX) commenced.

It was the flight's first opportunity to get to sea in 2010, and the crew was composed of an observer flight commander, two pilots and a utility aircrewman, for whom it was his first time at sea as an aviator.

The damage control exercise was progressing normally, and command made the decision to launch the helicopter as part of a casualty evacuation scenario. Two of the ship's crew had sustained simulated injuries as part of the exercise, and the tasking was to launch in order to prove the ship's medivac capability, carrying the two simulated casualties and one medic.

The aircrew had already briefed for the Alert 30 period, and pre-flight duties had been allocated. Upon being actioned, the observer and aircraft captain were to proceed to the operations room for briefing. The co-pilot was to head to the aircraft to begin the pre-flight checks, while the aircrewman was responsible for the safety equipment fitting and briefing of any passengers in the hangar.

After being actioned, pre-flight events proceeded as briefed, with the three passengers arriving in the hangar approximately 15 minutes before launch time. Perceiving that they were running short of time to make the launch, the aircrewman made the decision to fit the two simulated casualties with cranial head and eye protection, as opposed to Alpha 400 helmets (The medic had already been fitted for an Alpha 400). This decision was based on his understanding that cranials are an approved form of head protection for flight in Navy aircraft. However, he did not fully understand the requirements and caveats outlined in ABR5150 Chapter 12.

At the time of printing, ABR 5150 states that the Alpha 400 is the preferred passenger head protection. Where it is not possible or is unsuitable for certain operations, other approved headwear, as detailed in the below table, is to be worn.

LEUT B MARTIN,RAN

Night Illusion

While on Basic Pilot Course in 2006 at Basic Flight Training School (BFTS), Tamworth NSW, flying the CT4B, one of my instructors and I were discussing the limited amount of night flying that is taught in the syllabus at BFTS. He said, "You'll find you'll do hardly any night flying on (Basic and Advanced) Course, then all of a sudden you'll be out on an operational sortie and expected to fly and operate at night for a significant amount of your day-to-day flying. Feeling like you've been thrown in the deep end you'll then ask yourself: 'Why don't we do more night flying on course?"

A year later, in early 2007, I found myself conducting the first night-flying phase at 2FTS, with only about 5 hours of total night flying logged. The sortie was Night Flying 3 which was the pre-solo check flight with an instructor to get your PC-9/A night captaincy.

There were a number of these sorties being flown simultaneously that night. The sortie profile consisted of circuits predominantly, with some minor practice emergency handling, all in the Pearce circuit area. It was a clear night, with light winds and very minimal illumination from the moon. It was approximately 2230 hrs local, and I was well rested before the flight.

Approximately half-way through the sortie I was on short finals for a standard night circuit with a touch and go. Once I had landed I applied take-off power shortly after and the aircraft began to accelerate. However, as I scanned down the runway I saw a white light and a single green light just to the left of the runway centreline, a few thousand feet further down the runway. Thinking these lights were the white tail light and green right wing tip light of another aircraft sitting on the runway, I decided to abort the take off.

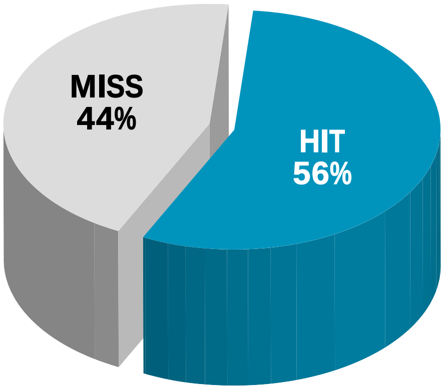
As I neared the lights I then realised that they were in fact one of the white runway sidelights and a green taxiway lead in light located just to the left of the runway centreline.

Runway 18/36 at Pearce slopes uphill from both ends of the runway towards the centre, which means you cannot see the far end of the runway until you are halfway down the runway itself. Therefore due to the curvature of the runway, the white runway edge light appeared to be a single white light, which when seen not moving and to the left of a single green light (the only taxiway lead-in light I could see, due to runway curvature) together with poor illumination from the moon, gave me the illusion of these being the position lights of another aircraft on the runway.

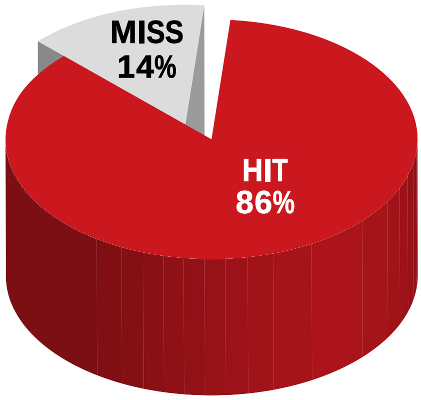
Although the situation came to a conclusion with a simple aborted take off, I found myself quite shaken by the earlier feeling of being about to collide with another aircraft on the runway. After discussion with my instructor, I decided to complete the sortie the following night. This was the first (and probably not the last) time I had scared myself while flying, and was not a very pleasant feeling whatsoever.

This situation highlights that even when night flying in quite good conditions, a pilot's vision depth perception will always be degraded compared to day flying, and other night illusions can present themselves at any time. What I learnt from this experience was that if you do experience a night illusion or something appears not quite right (i.e you perhaps havn't recognised the illusion yet), you should always stick to your learnt procedures and err on the side of caution. Had it actually been another aircraft in front of me on the runway, the result could have been potentially catastrophic. I do agree with what my instructor told me back at BFTS, and since that day have realised the importance of conducting occasionally flown situations or evolutions with more caution.

Probability (HEP) solely using lookout, 44%, is considerably higher than the HEP for other general task errors of omission, which is in the order of 1% (Bedford & Cooke, 2001). So not surprisingly there was an increase in the reporting of traffic separation breakdowns in the US as TCAS was gradually adopted by the airlines leading up to the deadline of 1993. TCAS reports to the US Aviation Safety Reporting System (ASRS) database increased from 6 in 1988 to 1092 in 1992 (Mellone, 1993). Consequently the system was able to improve awareness of the risk while concurrently attempting to mitigate it.



Unalerted encounters with mean detection 0.99nm



Alerted encounters with mean detection 1.4nm

A DAHRTS database search of BFTS, 2FTS and 723 Squadron ASORS using the keyword ‘Human’ was conducted for the period beginning 2005 to end 2010. Analysis of *runway incursion, circuit/traffic confliction, separation breakdown, near mid-air collision* and *violation of controlled airspace* revealed these ASORS comprised 17% of the total ‘Human’ related ASORS for this period (135 from a total of 787). However the breakdown between units is 19% of the total for BFTS and 2FTS, but only 9% for 723 Squadron. Using the raw ASOR numbers this was calculated to be a statistically significant difference (chi-square = 8.20; $p < 0.02$). So why the difference and what can we anticipate for the future?

Discussion

BFTS and 2FTS training operations are probably conducted in higher density airspace than 723 Squadron, and with the primary role of training student pilots there is more opportunity for distraction from lookout coming from within the cockpit at BFTS and 2FTS. I acknowledge 723 Squadron conduct pilot training, but I’d suggest it’s probably a smaller proportion of the squadron’s total flying than it is for BFTS and 2FTS. However, that may change in the future if the basic rotary wing training for Navy and Army is established at HMAS *Albatross*. This will lead to an increase in traffic and likely associated increase in the risk of mid-air collision. The probability of a miss does not need to change for this to occur, if only the exposure increases then the likelihood and risk will increase, since likelihood = probability x exposure (Woodruff, 2005). Therefore the increased risk of a collision could be described as a foreseeable risk. The cost to fit TCAS to an entire fleet is not cheap, but it has been successively managed in commercial industry in response to the regulations, and it only needs to save an organisation from one mid-air collision to provide the return on investment. Like most new technologies the introduction of TCAS into the commercial aviation system has not been trouble free; however, the Flight 498 accident itself managed to penetrate the defences of visual flight conditions under radar control with radio and transponder equipped aircraft.

In a 1993 survey of pilots in the US, evaluating the operation of TCAS following its introduction, the overwhelming response was that it enhances safety (>93% from 2683 citations) (Mellone, 1993). And we now have the benefit of almost two decades of technological and procedural evolution since it was first mandated there. Looking towards the future in Australia CASA is now working on Project AS 10/13, Air Traffic Management Technology Implementation, in response to the Government’s Aviation White Paper of 2010. This will likely lead to wider regulation of the use of TCAS, Automatic Dependent Surveillance-Broadcast (ADS-B) equipment and mode ‘Sierra’ transponders (CASA, 2011).

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