



NAVIGATION

Newsletter of the Australian Institute of Navigation Inc

Volume 16, No 81 June 2017



To all Members and Fellows of the AIN, I had the privilege of presenting the Dux award recently to No 34 RAN Intermediate Navigation Course at HMAS Watson. I was very pleased to be able to

present the Dux awards to (Theory Dux) LEUT Nicholas Walczak, and (Practical Dux) LEUT Mitchell Smith. My congratulations goes to all the members of that course, who all performed to a very high standard. I welcome them as some of our newest 'navigators'.



LEUT Walczak (Theory Dux) with Prof Chris Rizos at the No. 34 RAN Intermediate Navigation Course Graduation

I note too that our connections with the RAAF 'centre of excellence' for navigation at No 1 Flying Training School is still very strong. Our Executive Secretary, Kym Osley travelled to East Sale on 1 June 2017 to be the Reviewing Officer and to present the awards for navigational excellence to the deserving graduates of No 34 and No 35 Air Combat Officer Course.

The passing of Rosemary Coleman, one of our Past presidents, was appropriately

acknowledged at the March meeting this year. Rosemary was not only an incredibly talented aviator, educator and navigator, but she also did much to foster greater diversity in all those communities. She will not be forgotten.

I also was saddened to hear of the passing of one of our doyens of the navigator fraternity, CAPT Daryl Smith. He was both a Fellow and a Councillor of the AIN and has been a strong advocate for recognising excellence in the merchant marine professions. He was key in establishing a memorial to Merchant Seamen at Bicheno, Tasmania, which also includes a memorial to air and sea navigators who lost their lives in serving their profession. The AIN symbol appears proudly on that memorial.

I have been able to attend some of the AIN meetings in Sydney in between my busy commitments to lecturing and research at UNSW. The quality of speakers has been excellent, and I commend the monthly dinner/speaker meetings to you all if you can make it along on the second Wednesday of each month.

In this newsletter there are a couple of articles which I believe might make us think. One in particular is about the move to driver-less cars, airliners and other modes of transportation. We are on the cusp of this revolution and the solution for each of these challenges will not just be technical; the solutions will need to take into account the legal, technical, ethical and cost dimensions as well. It will be an interesting decade in terms of how spatial awareness, navigation, and automation will change our lives!

**Prof Chris Rizos and the AIN Council,
June 2017**

**Notice of Technical/General Meeting
Number #611 – Wednesday 14th June
2017**

For June the AIN (in conjunction with the Company of Master Mariners and the Nautical Institute) will have a Dinner and Presentation by Commodore Chris Smith, RAN, who will talk about the capabilities and operations of the RAN's new large ships – the Landing Helicopter Dock (LHD).



**Commodore Smith, RAN (then Captain Smith)
on the deck of the HMAS Canberra in 2016**

Chris is a former Commanding Officer of HMAS Canberra (LHD) and is now Commander Surface Forces, based at Garden Island. Commodore Smith assumed command of the Canberra in June 2015, and was Captain of the vessel when it deployed for Operation Fiji Assist. Prior to 2015, he had an interesting career filling many different roles in the navy, including commands of the HMAS Gladstone and HMAS Darwin, and being involved in many different operations. Chris joined the RAN in 1989, after commencing work as a bank teller. Of note, he applied to the Army, Navy and Air Force in 1989 and the Navy got back to him the fastest! It will be a great presentation and we look forward to it!

Dinner: The evening includes a two-course dinner plus tea/coffee (cost is \$40 payable on the night). We will be joined by the Nautical Institute and the Master Mariners.

When: Wednesday, 14th June 2017

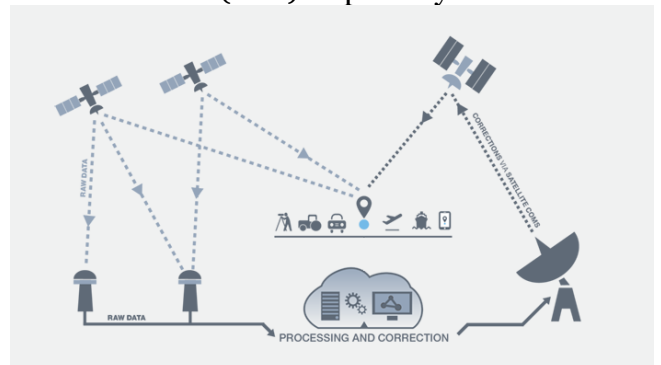
- From 1800 hrs – drinks in the Fairmont Restaurant Bar, Level 1
- 1830 hrs - dinner commences
- 1945 hrs – presentation commences
- 2100 hrs – expected conclusion

Where: Fairmont Restaurant, Level 1 at the Occidental Hotel, 43 York Lane, Sydney NSW (very near the Wynard Station).

RSVP: Kym or Debbie Osley, AIN Executive Secretary, kym.osley@defence.gov.au or kym.osley1@gmail.com (or 0466 253 100 (leave message)) by NLT Close of Business on 12th June 2017. Partners and friends/colleagues as always are very welcome.

**Australian Space Based Augmentation
System Test Bed**

As most AIN members would be aware, one of the key themes that came from the 2015 AIN-Defence Seminar on 'Civil and Military Operations in a Degraded Space Navigation and Communications Environment' was the need for improved GNSS resiliency. One method of achieving this was to have Australia procure its own Space Based Augmentation System (SBAS). The good news is that Government is now seriously looking at SBAS and has asked Geo-science Australia (GA) to take the lead in a test project of a SBAS for the Australian and New Zealand region as a part of the development of the Australian Government's National Positioning Infrastructure (NPI) Capability.



SBAS correction signals are generated at fixed known sites and then used to correct mobile receivers

Of note, Mr Ian Mallett, AFC, a member of AIN, is the Chair of the SBAS Sub-Group that is looking at the aviation industry.

There are several different types of SBAS manufactured by various European, US and other manufacturers, but they all operate similarly. The SBAS concept is based on GNSS measurements by accurately-located reference stations deployed across an entire continent. The GNSS errors are then transferred to a computing centre, which calculate differential corrections and integrity messages which are then broadcasted over the continent using geostationary satellites as an augmentation or overlay of the original GNSS message. SBAS messages are broadcast via geostationary satellites able to cover vast areas.

SBAS compensate for certain disadvantages of GNSS in terms of accuracy, integrity, continuity and availability. For example, neither the USA's GPS nor Russia's GLONASS meet the operational requirements set by the International Civil Aviation Organisation (ICAO) for use during the most critical phases of aircraft flight, in particular final approaches. To solve it, ICAO decided to standardise several GNSS augmentation systems including SBAS.

SBAS will overcome the current gaps in mobile and radio communications and, when combined with on-ground operational infrastructure and services, will ensure that accurate positioning information can be received anytime and anywhere within Australia and New Zealand.

The two-year project will test two satellite positioning technologies, namely next generation SBAS (Dual-frequency Multi-Constellation) and Precise Point Positioning, which will provide positioning accuracies of the order of sub-metre and sub-decimetre respectively.

The project will investigate the feasibility of see Australia and New Zealand ultimately investing in their own SBAS, and join countries such as the United States, Europe, Russia, India and Japan, which have all invested in infrastructure that delivers satellite-based corrections via an SBAS.

The New Zealand Government has contributed an additional \$2 million to the initial \$12 million in funding from the Australian Government.

GA and Land Information New Zealand (LINZ) are working closely with the Cooperative Research Centre for Spatial Information (CRCSI) on the project. The CRCSI will oversee the evaluation of the effectiveness of an SBAS for the region, and determining the business case for a future Australian and NZ SBAS.

The CRCSI has already called for organisations from across the aviation, road, rail, maritime, spatial, construction, mining, utilities and agriculture sectors to participate in the test-bed. Several dozen proposals were received and have been evaluated to get to short list that will be funded and implemented over the period through to 2019.

In addition, an expansive cost-benefit analysis is proposed to determine what the likely cost benefits might be for Australia and NZ across the various industry sectors. It is likely that the cost benefits for aviation may not be as significant as for some other industries where SBAS might support revolutionary technologies such as people-less supply chains and driver-less vehicles.

Graduation of #34 RAN Surface Combatant Navigation Course

PROF Chris Rizos, President AIN, and CAPT Gavin Permain, Councillor AIN, attended the graduation of #34 RAN Surface Combatant Navigation Course on 28 April 2017 at HMAS Watson to present the major prizes.

The aim of the Surface Combatant Navigation Course is to train qualified and competent Navigators to serve in Major Fleet Units (MFUs). Students undertake a thirteen week course at HMAS Watson at the School of Navigation & Warfare. The theory component consists of eight weeks of classes, which includes advanced electronic navigation, pilotage, fleet-work, ship-handling, surveying

and warfare. The five weeks of practical work includes visits to port services, tug-work, practical ship-handling, and navigation training in bridge simulators.

The training culminates in the two week Sea Assessment Period (SAP), which is the means by which students are formally evaluated to ensure they are at the standard required to perform the role as a MFU NO. The students managed valuable training at sea within the Whitsunday Island Group. During the two week period the students conducted numerous pilotages in various states of degradation to test their skills and ability.



LEUT Mitchell Smith (SAP – Sea Assessment Period Dux) with Professor Chris Rizos

The Warfare Community Medallion acknowledges the student who most embodies Navy signature behaviours and values, and was awarded to LEUT Phillip Van Neutegem.



The Warfare Community Medal being presented to LEUT Phillip Van Neutegem by CDRE Chris Smith

PROF Chris Rizos presented the Dux awards to (Theory Dux) LEUT Nicholas Walczak, and (SAP DUX) LEUT Mitchell Smith. The AIN congratulates the RAN's newest navigators.



#34 Course - Class Photo L to R: LEUT Kamal Iqraam Ismail Royal Malaysian Navy, LEUT Mitchell Smith RAN, LEUT Gregory Wickens RAN, LEUT James Brandreth RAN (Course Officer), LEUT Nicholas Walczak RAN, LEUT Phillip Van Neutegem RAN

Graduation of Intermediate Navigation Course #58 at HMAS Watson – 2 June 2017

The newest RAN navigators graduated on #58 Intermediate Navigation Course from the School of Navigation Warfare at HMAS Watson on 2 June 2017. They all performed well through the nine weeks of theory and sea assessment. The sea assessment period is particularly demanding, and includes long sessions in the Bridge Simulator, and also practical navigation sessions aboard the RAN vessel the 'Mercator' in Sydney Harbour and Broken Bay.

The Community Service War Medallion was awarded to LEUT Cameron Eadie by CMDR Darren Rowe, and the Dux of the Course was awarded to LEUT Jerome Wong by CAPT Gavin Permain, AIN. The congratulations of all members of the AIN go to the graduates, award winners, and also to the Instructional Staff and to the #58 Course Officer, LEUT Christopher Murray.



Group: L to R LCDR Derek Robinson, LEUTs Michael Benjamin, Darcy Lefel, Kara Wansbury, Brianna McConville, Glynnis Bailey, Jerome Wong, Christopher Murray (Course Instructor), and CAPT Gavin Permain, AIN Councillor.



LEUT Jerome Wong being congratulated as the Dux of the Course by Captain Gavin Permain, AIN

RAAF/RNZAF Air Combat Officer Graduation at East Sale – 1 June 2017

On 1 June 2017, six new Air Combat Officers (ACOs) graduated from Nos 34 and 35 ACO Course at RAAF Base East Sale. Four will be taking up flying positions within the RAAF, and two will return to NZ to fly with the RNZAF. Special congratulations go to PLTOFF Antonia Flocco, who not only received the AIN award, but also many others! She was singled out by the instructing staff for achieving a high level of excellence. The Reviewing Officer for the parade was Air Vice-Marshal Kym Osley, Secretary of the AIN, who presented prizes to recipients on both of the

ACO courses, as well as those on No 47 Operations Officer Course that also graduated the same day.



AVM Osley inspecting the Air Combat Officer graduates at RAAF East Sale



VALE Captain Daryl Smith



One of our long term Councillors and Fellows, Captain Daryl Smith passed away in April 2017 aged 86. Daryl had a very distinguished career in both the Navy and in commercial shipping. He has left an impressive legacy through his championing of commendation awards for merchant mariners, and through his efforts to recognise the sacrifice of merchant sailors and navigators through the building of a memorial in Tasmania. While Daryl lived in Tasmania, he kept in close

contact with the activities of the AIN and was very active in the affairs of the Institute. Our sympathies go to Nola, his wife, and son Steve and other members of the family.

VALE Rosemary Colman Past-President AIN

The AIN thanks Ms Cathy Hobson for this summary of Rosemary Coleman's life achievements.

Born 29 October 1935 in Sydney, Rosemary trained to become a music teacher, which she thoroughly enjoyed and was initially posted to Canberra.

Rosemary took up flying as a hobby. By 1970 she had achieved her private pilot licence and in 1972 was awarded the Sir Donald Anderson Trophy (for highest academic achievement in passing her commercial pilot theory exams in that year). She joined the Australian Women's Pilot Association (AWPA) until 2012 (retiring due to illness). For the AWPA she would be NSW President (1976-77) and an active member.

In 1974 she joined the International Women Pilots (the "99s") and would be a member for 28 years. Over those years she would be Hon Sec, Hon Treasurer, Reporter and Vice-Governor of the Australian Section (on more than one occasion). She also was a co-convenor of the first overseas conference of the 99s held in Canberra in 1978 (quite a coup, and she received a wonderful volume of congratulatory messages from numerous 99s members).

During the 1970s she gained additional flying ratings and passed the Senior Commercial pilot theory exams and became heavily involved with the RACNSW. Here she was a Director, co-hosted the conference of the Royal Federation of Aero Clubs, and was Editor of their Newsletter.

The 1980s was her introduction to the Australian Institute of Navigators (AIN), elected as a Councillor, Hon Treasurer, and assisted with the International Association of Institutes of Navigation (IAIN) triennial conference. She also joined the Guild of Pilots

and Navigators (GAPAN), of which she was very proud.

In July 1989 Rosemary retired from teaching and became a freelance journalist in aviation. Here she discovered that the instructors teaching Principles and Methods of Instruction (PMI) for flight instructor courses were not qualified to teach this new course, so she wrote a PMI component tailored to ensure that the trainers could teach the new trainers. This led to her co-running courses for the first Certificate in flight instructor methods with Jack Davies in 1991. This was very successful but the 'drought' in civil aviation, with flying schools closing down, meant insufficient numbers to warrant continuing.



In 1989, the AIN elected Rosemary as Vice-President, and then President in 1991. That year she chaired one session of the meeting of the IAIN in Cairo, and then was elected as a general committee member of GAPAN, running the functions for NSW. Rosemary died 8th March 2017 in Sydney.

Autonomous Cars and Planes – Moving from Sci-Fi to Reality

Driverless Cars?

Almost all the AIN members would have noticed media coverage of the testing of driverless cars. So how close are we? Most of the major auto manufacturers have active programs to introduce driverless cars. Earlier this year Ford announced that they would introduce a range of cars with no steering wheel, accelerator or brake pedal. However, Ford expects that these vehicles would be operated by a taxi service that would use these vehicles in lieu of normal manned-taxis. Nissan, Volvo and Jaguar are among the other

manufacturers likely to field their own driverless cars in the not too distant future.

The navigation of these cars has by no means been determined, and the current techniques being explored include the use of artificial intelligence, combined with cameras and lasers. Of course GNSS will also play a role, however the sole use of GNSS is very unlikely due to the ease with which it can be jammed or disrupted.

Irrespective of how it is navigated, the key issues to be sorted out include ethical questions, legal and the cost issues. The software or artificial intelligence in the driverless car may have to make very difficult ethical decisions in certain scenarios. How would it make the life and death decisions inherent in an inevitable car accident? How would it judge the threat to the life of its occupants versus others if it came down to that choice?

Legally, we would have less car drivers at fault if we have more driverless cars on the road. In the future we can expect much more blame to be attributed to the manufacturers and programmers of the driverless cars.

Quite obviously the driverless car navigation and control systems could be expected to cost more than normal cars, at least for the first decade. So what percentage of the driving population would pay a significant premium to be rid of the chore of driving? Eventually we could see that normal people-driven cars may become fewer and more expensive than driverless cars, and we may see people paying for the privilege of driving! So within as little as four years, but certainly within 10 years, driverless cars on Australian roads will be a part of our lives!

Pilot-Less Airliners?

For most airline passengers, they would get comfort from seeing a human pilot in the cockpit taking the same risks that they are taking. However, the risk that they are taking may not change, or might even be potentially reduced by not having a human in the cockpit.

The reality is that most airliners for the vast majority of their time airborne are flying on auto-pilot with the humans monitoring the operation of the systems. This is not the result of any lack of desire to 'pole' the aircraft by the pilots (normally exactly the opposite) but is largely driven by the need for the most efficient aircraft operation, which tends to be under automatic mode rather than when pilots are hand flying.

Unmanned aerial vehicles (UAVs) are flown thousands of times a day around the world – but of course they are not carrying passengers. However, BAES recently flew a small airliner from one airfield in the UK to another without a human in the cockpit. The flight went without a hitch, and given further testing the technology exists to fly passengers safely in pilot-less planes.

What we are likely to see first is airliners that do not have a human pilot aboard, but which are remotely monitored by a qualified pilot who could intervene potentially in the event of an emergency. The one pilot could be connected remotely from anywhere in the world, in a way similar to the military pilots located in the US who operate the drones flying over the Middle East. The savings may be generated by having one pilot monitor several airliners/cargo aircraft. This is likely to occur within the next 10-15 years, starting with cargo-carrying aircraft.

In the longer term we could expect to see truly pilot-less airliners operating in a similar autonomous way to driver-less cars....but that may be 15 to 20 years away for main stream airlines.

Small Satellites Rise in Importance

There appears to be a growing trend around the world for Government and Defence to increasingly leverage the capabilities of commercial satellites for imagery and other applications. The US National Geospatial Intelligence Agency recently entered a contract with the US-based firm 'Planet' to acquire commercial satellite imagery.

Similarly, the Australian Department of Defence is progressing a similar program to buy unclassified satellite imagery from commercial vendors.

Of course the Australian Department of Defence has been doing this for years, but the difference is that Defence is looking at getting its own ground station and directly tasking the satellites and then gaining access to the imagery intelligence stream. This would shorten the response time, and reduce costs to Defence.

What is really driving this change from Defence mainly using bespoke, highly classified long-term reconnaissance constellations of satellites is the rapid way that commercial satellite capabilities are closing the capability gap on military systems, and are far greater in number and lower cost.

The commercial demand for satellite imagery has increased dramatically, along with the expectation that this imagery will be multi-spectral and have significant analysis and value-adding done to the imagery before being delivered to the client.

The use of smaller and more numerous commercial satellites means that revisit rates are much reduced, and therefore the age of the imagery can be less than an hour rather than several days old.

The commercial community is also on the cusp of much greater access to satellite imagery through small, lower cost satellites to support farming, environmental monitoring, etc.

What this trend does point to, is the likelihood that Australia will probably host an increasing number of satellite navigation/tracking/download stations. Australia is well located on the globe to cover many areas of interest, and has the space and well developed infrastructure to support more satellite stations.

AIN Plaques

Some of our members and Fellows of the AIN may like to add the Australian Institute of Navigation Plaque to your collection. These are the same basic plaques that are presented to our prize winners at the RAN School of Navigation warfare and to RAAF prize winners at the RAAF No 1 Flying Training School. The badges are hand moulded in high quality resin and then hand-painted (as you can see in the photo below). They are then attached to a hard wood satin finished wooden plaque. The plaques with the AIN emblem are available for \$50 plus postage from the Executive Secretary. All profit from the plaques is returned to the AIN account to fund our gifting of plaques to worthy prize winners and to our dinner speakers. If you would like to order a plaque, please send an email to Debbie.osley@yahoo.com and to kym.osley1@gmail.com.



AIN Webpage

Please send any items of general interest to the Secretary that you may have. The website is at www.ain.org.au.

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AIN Membership renewal information for 2017-18 will be sent out in the near future.