



NAVIGATION

Newsletter of the Australian Institute of Navigation Inc
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Fellows and Members,

Like many organisations, the AIN has suffered a hiatus during the COVID lockdowns over the past year. While NSW and ACT continue to be in lockdown at this time, we are starting to see the light at the end of the tunnel. Hopefully from later this year we will be able to have the regular monthly dinners and Speaker presentations in Sydney.

Many of our members have been doing the 'hard yards' – going in and out of quarantine as they undertake their various maritime, aviation and other duties. Mariners in the cruise ship industry and those involved in airlines will be significantly impacted for many years as tourism slowly returns to pre-COVID levels.

For many of us working in 'essential' industries – whether it be shipping of cargo or Defence or supporting other key non-discretionary activities, things probably have not changed too much as a result of COVID-19, however it is noteworthy that many seafarers have found themselves stranded on board and overdue for leave due to travel restrictions. This in turn adds to the accident/incident risk due to issues of fatigue.

I myself am still doing a significant amount of sea-time work in commercial shipping and I know our members of the Defence Forces are, if anything, busier than ever. While I assume the October meeting will be unlikely to proceed given current COVID restrictions in NSW, I may be back in time for the November meeting. I am currently aboard RTM Weipa with 85,909 tonnes of bauxite from Weipa bound for the QAL Aluminium Refinery at Gladstone.

I also congratulate our Secretary on his new appointment as the NSW Defence Advocate, where he will support Defence Industry and in particular those companies located in NSW on behalf of the NSW Government.

I look forward to when visits can resume at HMAS Watson so as to meet new and upcoming RAN graduates as well as having the honour of presenting the AIN Dux Award to the worthy recipients.

Of course the Institute will provide advanced warning when we are able to resume the meeting schedule.

In the meantime, stay safe!

***Captain Gavin Permain, FAIN
President - AIN
September 2021***

Urban Air Mobility and Navigation

The Urban Air Mobility (UAM) 'vision' is for uninhabited vertical takeoff and landing vehicles that can carry people and cargo

around populated areas, fully integrated with regular passenger and freight carrying airlines. What is enabling the emergence of UAM as a reality is large electric and hybrid UAVs and accurate ways of integrating and controlling them.

UAM is widely accepted as one of the technology areas that will exponentially grow over the next two decades. Over 10 million UAM trips are expected to be undertaken annually by 2040 in Australia alone. Of course helicopters are currently used as UAM vehicles, but their use is limited by their high cost. Electric and hybrid UAM vehicles that can do a short hover and landing, but which use wing lift for the cruise, will greatly reduce the cost of UAM to a point where it may be a viable alternative to land transport in cities.

A key issue is the air traffic management of UAM vehicles, and the integration of these vehicle flightpaths with other users. There have been several trials in Australia of air traffic management systems and processes, including one late last year in Geelong.

This trial was rated as successful by the participants, which included Telstra, Thales, Australian Unmanned Aerial Vehicles (AUAV) and the city of Greater Geelong. This location was chosen due to the regions varying geography, as well as the city's dedicated Smart Cities team. The Geelong Low Altitude Airspace Management (GLAAM) Initiative demonstrated that drones can be operated safely in a semi-urban environment as well as be used effectively in the development of Australia's Smart City Concepts. However, the system only allowed the drones to fly in low altitude airspace (below 400ft).

The greater challenge of future total integration of UAM and regular aircraft operations is being examined by CASA and AirServices Australia, who are working closely with the key UAM companies to see how this might be done. In general, UAM operations would be conducted at lower altitudes but this will still require a far more capable air traffic management system to accommodate the denser traffic flows, the unpredictable nature

of UAM tasking and the highly accurate navigation required for safe operations in very close proximity to buildings and people.

An initial concept of operations for UAM Air Traffic Management has been developed for comment by AirServices and EmbraerX and is available for viewing on the web at https://daflwcl3bnxyt.cloudfront.net/m/3dc1907d3388ff52/original/PPJ016561-UATM-Concept-of-Operations-Design_D11-FINAL.pdf



It is expected that UAM operations will progressively get more numerous over the next 20 years and that, initially, UAM operations will be managed within the current air traffic management system. This means that UAM vehicles will generally be manned and use visual traffic separation and radio in a similar way to current helicopters.

As the traffic density increases (to a medium level as in *horizon 2* in the concept) towards the end of this decade, there will be increasing unpowered UAM vehicles and there will be a need for a more dynamic air traffic management system. It is expected that UAM corridors (above 400' AGL to avoid the personally operated UAS' but below most regular public transport that is about 1500' over cities) will be established to deconflict UAM operations.



In the period 2030-40 a fully dynamic air traffic management system will be needed to accommodate mainly unpiloted UAM vehicles operating optimally to meet very flexible tasking across our cities. This is a significant change from the air traffic management system that has been in use for about the last 100 years – which has relied on maintaining relatively large separation gaps between traffic in controlled airspace. It is likely that the dynamic system will require automated control of the UAM vehicles and regular aircraft operating over cities to provide a much smaller margin of time and distance separation.

All UAM vehicles will require highly accurate navigation and a system for transmitting and receiving position signals for the vehicle and other conflicting vehicles. In some ways it is going to be a very similar problem set to auto-driven land vehicles – but with the added challenges of weather and the third dimension!

The concept also notes that many more small heliports will be required across urban areas and that the final approach and departure procedures for these heliports will need to be developed to meet safety and noise requirements.

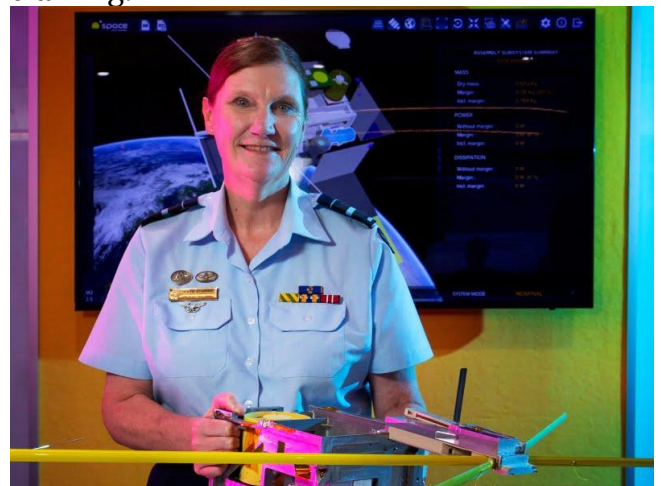
Australian Defence Space Division to be Formed from 2022

The recently released *2020 Strategic Update and Force Structure Plan 202* has highlighted a major change in the way Defence views the

Space Domain and military operations in space.

Since 2020, Defence has been undertaking a Space Domain Review that is leading to quite significant changes in the organisational structure, command and control of space operations and the progression and sponsorship of space-related projects. The Space Domain Review is expected to report to higher committees before the end of 2021.

The most recent step in this process was the announcement by Chief of Air Force Mel Hupfeld that Defence will be creating a (Joint) Defence Space Division that will be Joint in focus, although it will initially be supported by Air Force Headquarters. This organisation will be stood up from the start of 2022 and will be initially commanded by AVM Cath Roberts, who is a very experienced and highly regarded leader within Defence. She has previously been responsible for the F-35 Program and is an aeronautical engineer by training.



Air Vice-Marshal Cath Roberts, the first Head of Defence Space Division

The Defence Space Division is a step short of creating a Defence Space Force that is the equivalent of the other Services, although that may come over time. Of note the US has created a dedicated Space Force separate from the other Services. The Australian model is broadly similar to what the UK recently adopted to stand up its initial Defence Space organisation.

An ADF space command centralises policy formulation and capability planning, enhances cooperation with like-minded allies, and energises networking with Australia’s rapidly growing commercial space sector.

The Defence Space Division will bring together the three military branches, along with civilian representatives from Defence, and potentially other government agencies, to ‘establish an organisation to sustain, force-generate, operate space capabilities and assign them to a joint operation command if needed’.

The new Division will have a big say in two very key upcoming projects - new satellites for communications (Joint Project 9102B) and an Australian constellation of satellites for intelligence, surveillance and reconnaissance (Defence Project 799 Phases 2 and 3).

Establishing a space command will be a good opportunity to centralise and sustain professional expertise, both uniformed and civilian, within the defence organisation. To date, space-related projects and activities have been spread across several Services and Groups, and been managed by a number of Capability Managers. The Space Division will provide a ‘centre of gravity’ for concentrating expertise in a manner that ultimately establishes a *permanent cadre of space professionals* within Defence.

Establishing a permanent staff for an ADF space command—and, indeed, going further to establish a formal career path for space professionals for uniformed and civilian defence employees—would lift Australia’s ability to manage both space capability acquisition and space policy development.



First commercial rocket launch in South Australia earlier in 2021

The Space Division will work closely with the Australian Space Agency and there will be liaison staff embedded between the organisations. The Defence Space Division should also provide a single entry point for space-related industry that will be important in generating the required sovereign space capabilities in Australia.

It can also contribute towards more ambitious opportunities for the ADF in using space. For example, there’s growing support in the space sector for Australia to develop the means to launch Australian-made satellites on Australian launch vehicles from Australian launch sites on a regular basis.

Mission Aircrew Course Graduations at East Sale

The Air Mission Training School (AMTS) has continued to operate through the various COVID restrictions to graduate non-pilot aircrew to be crew on maritime, air refuelling and fast jet (F-18F/EA-18G Growler) aircraft.

The AIN has been awarding prizes to RAAF non-pilot aircrew graduates for over 40 years. The Australian Institute of Navigation Award for the highest academic assessment on the course. It is presented to the trainee who achieves the highest overall mark in ground school. Ground school covers theory lectures in over 20 different areas, with practical exercises and exams.

As expected, COVID has precluded the AIN from being represented at most of the Air Mission Aircrew Courses in 2020/21. For these graduations, the AIN prize has continued to be awarded at a smaller local-only ceremony.

However, the AIN Secretary, AVM (ret'd) Kym Osley was able to travel to East Sale with the Reviewing Officer, AVM Steve Meredith, Deputy Chief of Air Force for one graduation – the graduation of No 48 Mission Aircrew Course in April 2021. AVM Meredith is an Air Combat Officer himself, and flew on C-130 and then F-111 aircraft. Our host for the graduation was Wing Commander Arran Moore, CO of AMTS. Following a parade and a tour through the AMTS facilities, a graduation dinner was held in the Officers Mess at RAAF East Sale.



AVM Steve Meredith inspecting the graduates of the Mission Aircrew Course at RAAF East Sale

The AIN congratulates all the successful Air Combat Officers on graduating from their respective courses and in particular, congratulates all the winners of the AIN Award for Highest Academic Achievement.

Mission Aircrew Training in the RAAF

The 'Air Academy' at RAAF East Sale is now host to most of the pilot and non-pilot aircrew training in the RAAF. The Air Academy was created in 2019 to bring together a number of

different ADF aviation training schools in one location with common and modularised curriculum elements. The central idea is that, while Navy and Army officer aviation candidates (OAC) have already predetermined their speciality. Trainees at the AMTS undertake four sub-courses that encompass multiple streaming decision points that will determine the trainees career pathway.

The four sub-courses are:

- Mission Elementary Course – all trainees do this common component course irrespective of their future career path. The 12 weeks intensive training consisting of ground school, Air Warfare simulation, airborne training and delivered common skills required of all air power practitioners. The course became compulsory for all RAAF aircrew (except pilots) in January 2019.
- Mission Aviation Course – is more in-depth aviation training suitable for those who will be either Air Space battle managers or non-pilot aircrew
- Mission Aircrew-Introduction to Flying Procedures Course – is a common course for all non-pilot aircrew.
- Mission Aircrew Streaming Course – provides more specialist training relevant to either fast jet, air mobility or maritime/ISREW non-pilot aircrew.

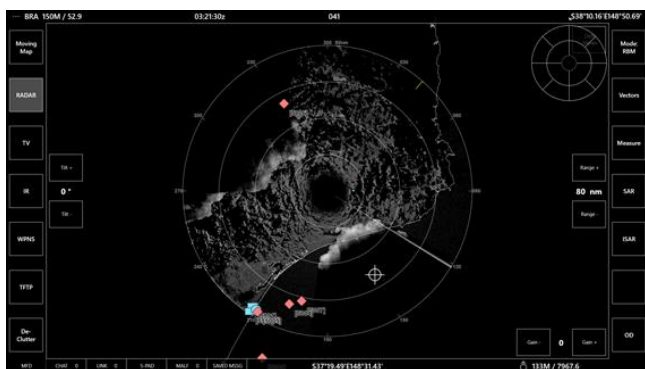


The 'office' for the trainee Air Combat Officers in the back of the King Air aircraft operated by 32 Squadron at RAAF East Sale

The alternate pathways are:

- air battle managers (for ground radar and the AEW&C Wedgetail aircraft),
- air mobility officers (for AAR operations in the KC-30)
- air traffic controllers
- maritime patrol and response officers (for employment in the P-8A Poseidon) and ISREW (for employment on the MQ-9 Reaper UAS or various special purpose EW/ISTAR aircraft
- ISREW
- operations officers
- weapons system officers (for the F-18F and the EA-18G Growler aircraft).

Unmanned and space capabilities are expected to be added to the list in the future.



Simulated radar and other air operations displays are used in the various phases of ACO training at East Sale

In total, most non-pilot aircrew receive about 36 weeks of training prior to commencing the conversion course on their respective aircraft types. This revised way of training non-pilot aircrew is still relatively new (only started in 2019) but all indications are that it is providing very good candidates for the relevant conversion courses.



ACOs destined for WSO training for the Super Hornet use right seat simulations of the King Air for some of their training

A key benefit of the modularised training at the Air Academy and AMTS is that it will allow trainees to diverge to another area of specialisation if necessary, without the need to start at the beginning of their new course.

Aside from taking common classes together, trainees at the AirA will be dispersed through all the accommodation at RAAF Base East Sale, rather than each school having its own accommodation.

This will not only assist in meeting learning outcomes, but will also foster an integrated approach to aviation operations. Having a whole of campus approach rather than isolated schools will lead to better immersion for smaller demographic groups.

The Air Academy is more than just a number of military aviation schools at the same location. The Air Academy will be more like a tertiary institution in that although trainees may be undertaking different courses, they will share accommodation and will at times take classes together. The linking of curriculum will also make it easier to diverge from one course to another if required.

RAN School of Navigation Warfare Graduations

Due to COVID restrictions, the AIN was only able to be represented at one Navigation Course graduation in the first 9 months of 2021. However, it was fortuitous that it was for the inaugural Intermediate Navigation Warfare Officer Course that saw eight Officers graduate on 28 May 2021 at HMAS Watson. The restructured syllabus and courses provides profession training and development for Navigation Warfare Officers.

This was one of the last Courses that LCDR Mike Gordon (an AIN Member) oversaw as OIC School of Navigation Warfare, who has since handed over to LCDR Sam Fraser.

LEUT Danica Latus was awarded the Warfare Community Medallion for being the graduate who displayed outstanding Navy values throughout the course.

The Secretary, AVM Kym Osley represented the AIN at the Graduation, and Kym presented the prize for Dux of the Course to LEUT Zackary Ryan.

2020 AIN AGM and Upcoming AGM

The last AIN AGM was held in February 2020, just before the COVID restrictions came into effect. The revised Constitution (which was circulated prior to the meeting) was approved, and the elected office holders for 2020/21 have been as follows:

- President – CAPT Gavin Permain
- Vice-President – CAPT Peter Martin
- Executive Secretary – AVM Kym Osley
- Treasurer and Public Officer – CAPT Dave Pyett
- Councillor and IGNS Representative – PROF Chris Rizos
- Councillor – Mr Simon McEvoy

Due to ongoing lockdowns, we will need to conduct a brief AGM this year as a video tele-conference (VTC) and are planning for this to be on 30 September 2021 at 1800 hrs. Please respond to the Secretary by email if you

would like to be included in the invitation for the VTC and the Secretary will include you.

80th Anniversary of Air Navigator Training in the RAAF

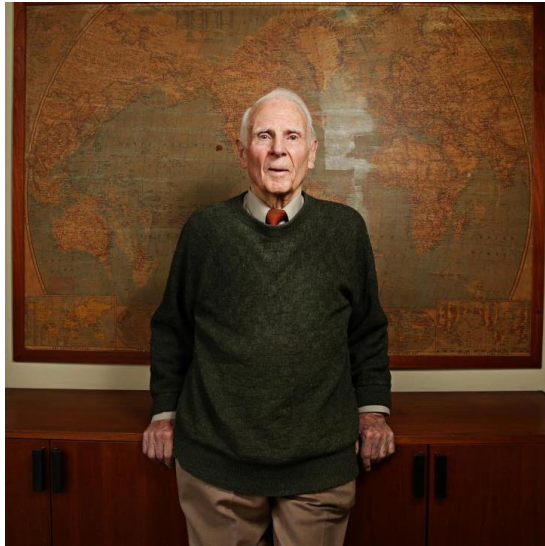
The Air Mission Training School traces its history through several recent name changes. In the late 1990s it was changed from the School of Air Navigation to the School of Air Warfare, before being renamed as No 1 Flying Training School to avoid confusion when the Air Warfare Centre was stood up. In December 2018 the name was changed to Air Mission Training School when the No 1 FTS moniker was transferred back to the unit that was stood up to do *ab initio* PC-21 pilot training at East Sale.

Thus AMTS can trace its history back to the three Air Navigation Schools formed to train air navigators under the Empire Air Training Scheme from 1941. Prior to this date, some RAAF pilots undertook advanced navigation training with the RAF in the UK, but the numbers were small.

So this year is the 80th Anniversary of formal navigator aircrew training in the RAAF. Hopefully COVID restrictions will allow a an anniversary dinner to be conducted at East Sale!

Vale – CAPT Reg Chasney

CAPT Reg Chasney was a long time member (for 66 years) of the AIN with membership number #42! Reg was born in the UK and lived in East London and Essex before he attended a grammar school in Walthamstow until the start of WW2. He then worked in his father's shop until joining the RAF from 1941 to 1947. He trained as a pilot and flew a variety of different aircraft in the RAF, including Harvards, Mosquitos, Spitfires, Lancasters and Lysanders. Reg was also involved in instructing aircrew trainees in Canada towards the end of the war.



CAPT Reg Chasney in front of a map of the world at his home in Sydney depicting his lifetime travels – which were many!

After the war, Reg flew DC3s with British Airways before moving to Australia in the 1950s and flying piston-engined Constellations and the new ‘jet’ B707 with Qantas. Reg qualified as both a Navigator and Captain on the first B707 operated by QANTAS Empire Airways. Up until his passing at age 97 on 13 September 2021, Reg still had a share in a high performance sailplane. Reg lived for about 60 years in Neutral Bay until moving to Ingleside.

Celestial Navigation Trainer and Synthetic Navigation Trainers in the RAAF 1944 to the Present

Most people have heard of the Link Trainer that was developed in the US just prior to WW2 and was used up to about the 1960s by the RAAF, USAF and RAF, and many other Air Forces. It was a mechanical simulator operated by electrical and pneumatic systems to provide pilots with instrument flying training.

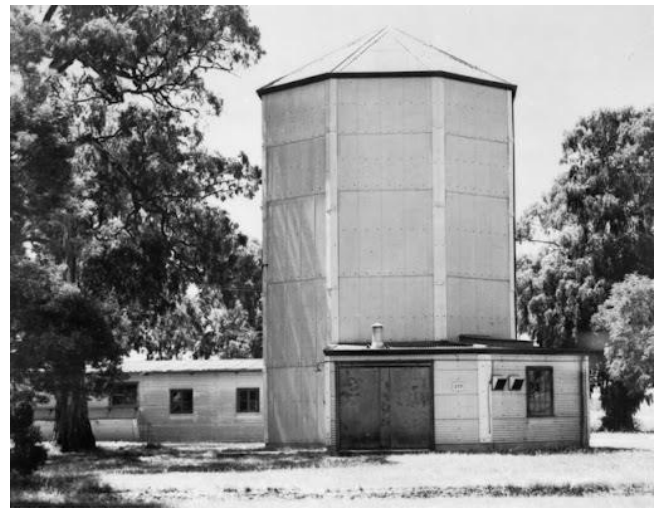
The early Link Trainers were designed specifically for pilot training, but as WW2 continued and long-range bomber aircraft were introduced, it became necessary to develop a more sophisticated ‘link trainer’ that could simulate the other aircraft crew positions and the interaction between crew

members. The first ‘mission simulator’ was born!

The Link Company developed the Celestial Navigation Trainer (CNT), which was quite advanced for its time! The CNT was housed in an air-conditioned, eight-walled building, 13.7 metres high by 7.9 metres across the base.

Aircrew members were positioned in a fuselage similar to the Link Trainer, but enlarged to carry a pilot, navigator, bomb-aimer, and wireless operator. Above the fuselage was a synthetic night sky for astro-navigation, and ground features could be projected on a white screen beneath the fuselage.

Thus, the pilot would fly the ‘aircraft’ while the navigator would use sky or ground references to reach an objective, where the bomb-aimer would take over to complete the mission. The CNT instructor could introduce bumpy flying conditions, changes of wind, create daylight or nightfall, scurry clouds across the sky, or arrange static to challenge the wireless operator (operating in Morse Code generally!).



AUSTRALIAN WAR MEMORIAL

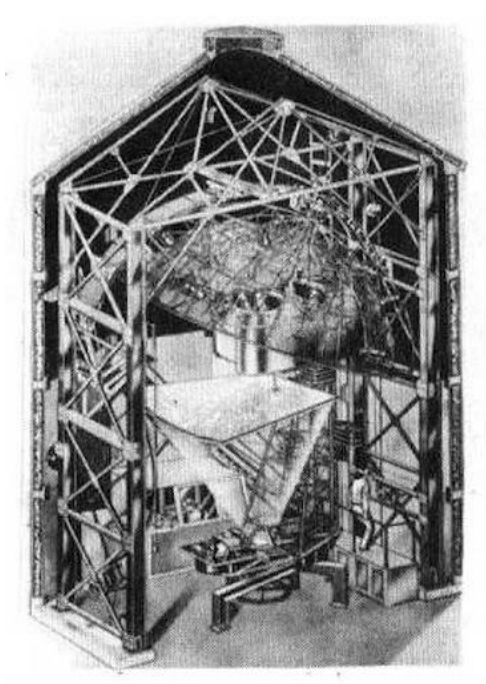
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The CNT at RAAF East Sale – Operating from 1944 to 1957 and removed in 1962

The RAAF purchased three CNTs in 1944, and they were initially registered with Link Trainers under the A13 series. However, the

CNTs were much more complex to maintain, and so they were grouped under the A63 designation to assist in the procurement of spares.

The first CNT, A63-1, was installed at East Sale, while various other localities, including Tocumwal and Rathmines, were considered for the other two units. However, because of servicing difficulties and spares backing, the East Sale installation was the only one proceeded with.



And What the CNT looked like inside!



A 'crew' demonstrating the fuselage module of the CNT

A63-1 operated until 1957 when it was superseded by newer DR Navigation Trainers and the CNT was finally dismantled and sold in 1962.

The Synthetic Navigation Trainer that many older RAAF Navigators trained on through to 2001, was introduced in the 1960s but was not given a RAAF aircraft serial number. This SNT simulated the characteristics of the HS-748 navigation training aircraft that was used from 1968.

In 2001, the current generation synthetic navigation trainer optimised to simulate the King Air training aircraft was introduced. The RAAF is currently progressing a project to replace both the King Air training aircraft system and the SNT with a new non-pilot training system.

Testing of 'Waymo' Autonomous Vehicles hits 20M miles on US Public Roads

While the public focus has been on efforts by Tesla and other more well known car companies, there are smaller companies that are achieving significant milestones. One of these is by a US company called Waymo. An array of lidar, radar and cameras can track what's going on all around the vehicle in a variety of weather conditions, Waymo says the system generates a 3D view of the vehicle's surroundings that humans would be able to understand. Along with other cars, the system can render pedestrians in addition to cyclists who narrowly pass by the vehicle.



The company says Waymo Driver Artificial Intelligence can detect small objects and

movements at a distance, such as a truck door in the middle of traffic and someone jumping out to deliver a package. It claims the AI can recognise steam emanating from utility holes and drive the vehicle through it, and understand the difference between a stop sign and its reflection.

Waymo has been testing its vehicles in San Francisco since 2009. Read more in *article...*
<https://www.engadget.com/waymo-autonomous-vehicles-update-san-francisco-193934150.html>

Malcolm Turnbull Joins Advanced Navigation Board

Former prime minister Malcolm Turnbull has been appointed director on the board of Advanced Navigation, as the company looks to accelerate its expansion across global markets. “We’re very pleased to welcome Malcolm Turnbull to the Advanced Navigation board” said Chris Shaw, CEO of Advanced Navigation.

Advanced Navigation began in Sydney in 2012 when engineers Xavier Orr and Chris Shaw commercialised their thesis research into AI neural network-based inertial navigation. Read more in *Spatial Source* article.
https://www.spatialsource.com.au/company-industry/malcolm-turnbull-joins-advanced-navigation-board?utm_medium=email&utm_campaign=SS%20Newsletter%2004082021&utm_content=SS%20Newsletter%2004082021+CID-fa83102caa8d48040878820c21ba1a21&utm_source=Campaign%20Monitor&utm_term=READ%20MORE

China Encourages use of Beidou Satellite System for Autonomously Driven Cars

The Chinese Government is advocating vehicle manufacturers to use the domestically developed Beidou satellite navigation system in their automated vehicles and other connected cars instead of the US government’s more widely adopted GPS constellation.

A Ministry of Industry and Information Technology notice has been issued that calls on carmakers to use a reliable satellite positioning system and then recommends the Beidou system. It appears that the Beidou system has not been mandated for cars

manufactured in China due to GPS being far more widely used than Beidou at this time.

While the Chinese authorities state that Beidou is more accurate than GPS due to a larger satellite network, some businesses have indicated that Beidou is not as user-friendly as GPS. Read more in *article...*

<https://asia.nikkei.com/Business/Technology/China-pushes-homegrown-GPS-for-connected-cars>

Economic Benefits of GPS

Over the decades since GPS was introduced, there have been many attempts to quantify the value added to the world economy by GPS. This value has gone up over the years as GPS is used in more and more applications, well beyond traditional navigation and time keeping.

A fairly recent estimate was made in a 2019 report sponsored by the National Institute of Standards and Technology. This report estimated that the loss of GPS would cost the U.S. economy \$1 billion a day, or \$1.5 billion if the technology failed in the April-May planting season for farmers.

Two years later, the costs could be even higher with the sharp rise in consumer solutions and location-based rideshare and delivery services. Read more in *article...*
https://spacenews.com/modern-civilization-would-be-lost-without-gps/?fbclid=IwAR3bjRghJc-QZuzZW_h1qWs3YnyOKME1R1F-yvL52Z3eUyB-faYxZLxKCE

New Contractor for Support to RAN School of Navigation Warfare

Since December 2020, Serco and KBR have provided a total of three staff at the School of Navigation Warfare at HMAS Watson to relieve the RAN Instructors of the administrative burden associated with their roles, allowing them to focus on their primary task of delivering instruction to Maritime Warfare Officers. The new positions work in conjunction with a newly established Serco Senior Navigation Instructor, also within the SNW. The Serco Senior Navigation Instructor is now working alongside three RAN and RN Senior Navigation Instructors to provide oversight and expertise in the practical

instruction of the more senior navigation courses.

Chief of Air Force, AVM Steve Meredith, and also the Secretary of the AIN, AVM Osley.

Australian Air Force Cadets – 80th Anniversary



Most Australians are aware of the Air Force, Army and Navy Cadet organisations. However, few are aware of how the Air Force Cadets have a strong connection to aircrew and navigation training. The Air Force Cadets, as the Air Training Corps, were formed in Australia in 1941 primarily to provide young male teenagers with basic aeronautical training that would assist them in RAAF aircrew or groundcrew training once they turned 18 and could enlist. Ultimately, about 12,000 ATC cadets enlisted in the RAAF during WW2 and many unfortunately died on operations.

The AAFC is now a part of the RAAF and is funded to provide air experience powered flying and gliding, as well as ground instruction in topics relevant to aerospace. The training has traditionally included flight operations and basic navigation and is being developed to include modules on the operation of Uninhabited Air Systems.



Cutting the 80th Anniversary Cake for the South Australian Air Force Cadets: AVM Osley, Secretary AIN, (centre) and the youngest and oldest cadet alumni at the event in Adelaide

A significant number of RAAF aircrew are ex-cadets, including both the current Deputy

Payment of Subscriptions for 2021/22

Subscriptions for 2021/22 would normally be due on 1 July 2021, but will be delayed to the end of 2021 due to the hiatus in AIN activities and meetings this year. The AIN uses this modest input of funding to procure the plaques and prizes for the AIN-sponsored prize on the eight to ten (total) RAN and RAAF graduations each year.

The current plan would be for 50% subscription to be paid for the period through to mid-2022. The prime method for paying subscriptions for the AIN is still by direct deposit through BPay:

Bank: Commonwealth Bank of Australia

Account Name: The Australian Institute of Navigation

BSB: 062001

Bank Account number: 00918322

Please include a clear identification name of the member when making the bank deposit.

The (50% due COVID19) subscription fees are:

- Patron, Life Members, Honorary Members (eg Chiefs of the Military Services) – no cost
- Senior Members (any Member or Fellow 60 years old or older) - \$25.00
- Full Members/Fellows - \$37.50
- Recent Graduates from RAN or RAAF 'navigation-related courses' – Free for the first year

If you require a tax receipt then please send an email that you have made payment (and the amount) to the Secretary below.

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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