

THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA

JSF CHALLENGES FOR AUSTRALIA'S LHDs

THE RENAISSANCE IN AIRCRAFT CARRIER CONSTRUCTION

DEFENDING OUR NEIGHBOURHOOD



AN OCEAN FOR MY KINGDOM

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Front cover: A USMC F-35B JSF conducting a vertical landing on the USN LHD USS WASP. The vertical landing procedure is far simpler in the JSF compared to the Harrier given the amount of computer control over the engine/thrust management built into the aircraft. (USN).



A TOYOTA LEXCEN FOR SEA 5000?

During the 1980s car makers Holden and Toyota teamed up to use a common platform to create a new car in the Toyota stable, the Toyota Lexcen, a version of Holden's Commodore. The idea was to save both car makers time and money in production given the similarities between both models. It was named after the naval architect Ben Lexcen, who designed the winged keel which famously helped win the 1983 Americas Cup.

In hindsight the use of his name could be interpreted as somewhat cynical, given his famed ingenuity in the design of the winged keel being used for a copy of something else. The car was a sales flop being neither a Holden or Toyota product. Commonality failed to produce success.

So with this in mind, the recent announcement by the government of \$72m to study the potential of the modified F-105 (Hobart) class destroyer platform as the basis for a common hull for the Anzac frigate replacement, if not done right, has the potential to be a sea going Toyota Lexcen.

The last Government's policy of using the Navy as its waterborne taxi service for asylum seekers arriving by boat, meant that the Anzac class frigates, which took a lot of the operational brunt, were impacted through greater hull fatigue and thus reduced service life. This has meant the project to replace the Anzacs has to be brought forward earlier than expected.

The premise behind the \$72m study is that our knowledge of the modified Spanish F-105 platform, given our building of three, somehow infers expertise in their build to afford some schedule advantages and cost savings. To date however, the experience of building the Spanish design has not supported that view. Quite the opposite in fact, which makes the study a little perplexing. The Minister for Defence has in fact been scathing of the builder's performance.

However, if this common platform idea were to prevail it could result in lost opportunities to break free of 20th century naval architecture thinking, given the F-105's pedigree stems from the 1980's NATO European frigate programme known as NFR- 90 (which ironically was looking for a common platform across five users and ended up failing with each pursuing its own solutions). The Spanish have also used the basic elements of the 1970's US FFG-07 hull design as a base to develop the F-100/105.

While the concept of a common platform might seem attractive it has never been very successful when building classes of ships outside of batch constructs of the same design.

One of the clichéd arguments used for a common platform is the ubiquitous claim that commonality will produce costs savings. Claims such as these are largely symbolic, unverifiable and rely on gut feelings or logical fallacies which people naturally gravitate towards. Commonality also generally comes at the cost of capability for it is applying a past solution to a contemporary problem for which the original was never designed.

One of the potential lost opportunities in pursuing a common platform to the Hobart class is in the area of propulsion. The last Defence White Paper described the future SEA 5000 class of frigates as 'general purpose but with a focus on anti-submarine warfare (ASW)'. If this remains the case in the upcoming 2015 Defence White Paper then the F-105's ASW pedigree might not pass muster.

The current propulsion technology trend for surface ship ASW involves using submarine like machinery to reduce noise and promote stealth. Take for instance the new 6,000t French Aquitaine class frigate which is designed for ASW and general purpose tasks. Its propulsion plant consists of diesel engines and gas turbines elastically mounted in sound proof modules high in the ship which are connected to electricity generators. The power produced is then sent by cables to two large electric motors to drive two fixed pitch submarine standard propellers. This arrangement makes them quite silent and avoids one of the main sources of radiated noise, the gear box. The Italian FREEM, British Types 23 and 45, German Type 125, US DD-21 and our Canberra class CVLs follow this integrated power supply model for propulsion, which also has savings in fuel use, maintenance and provides easier upgrade paths when more power is required through the ship's life from refits of new capabilities, such as high energy lasers etc.

This is the sort of 21st century technology that SEA 5000 should be pursuing. However, taking an existing platform means taking the existing propulsion plant arrangement, and its output, of two diesels and two gas turbines connected to a reduction gearbox driving two controllable pitch propellers. This hardly indicates an appreciation of the needs for ASW or future power requirements. This propulsion arrangement could of course be redesigned, but if one starts down that path where does that leave commonality, which was the *raison d'être* in the first place?

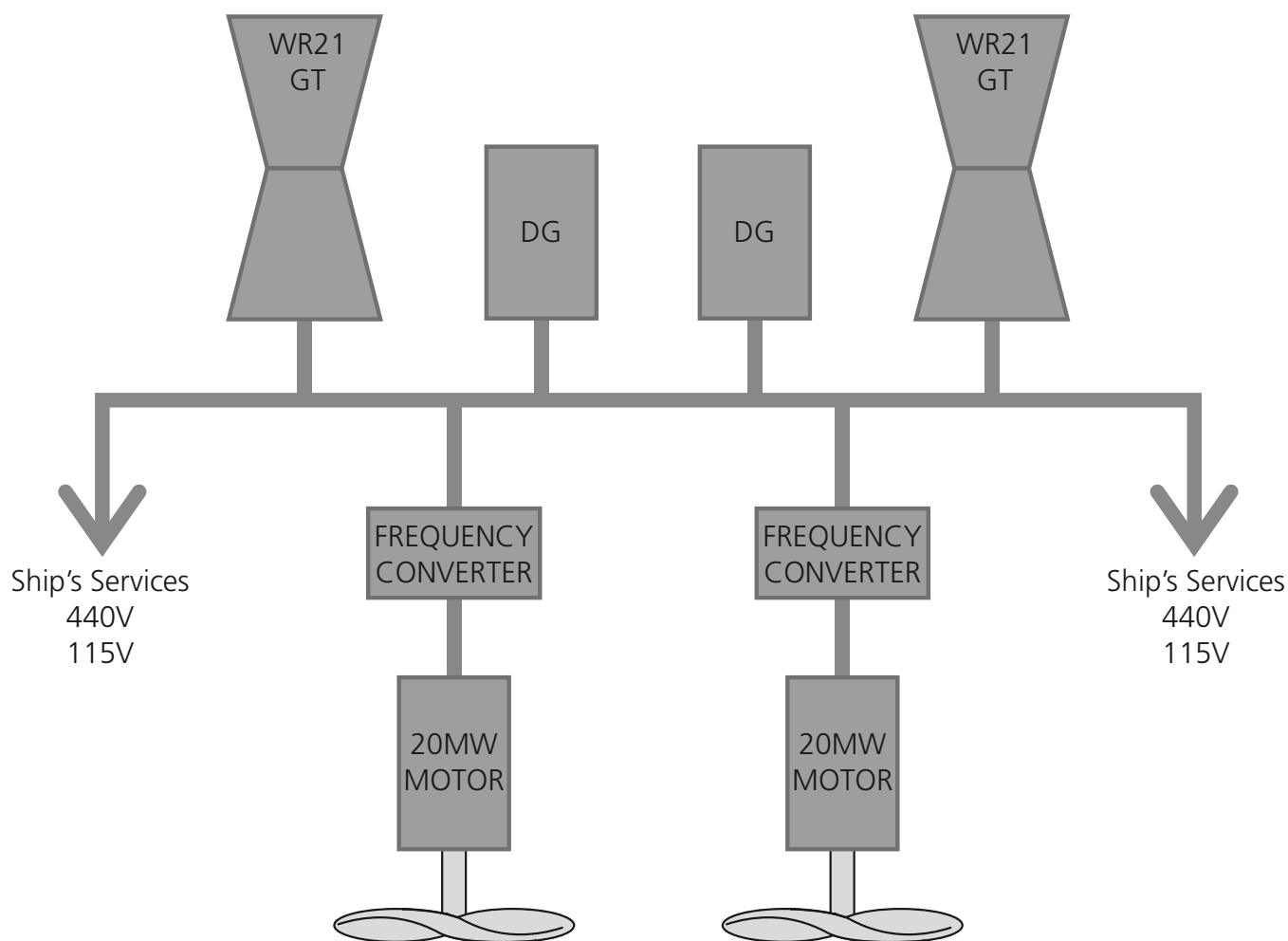
Common platforms tend to mandate older systems in their strive for commonality with the past. This column, and magazine, has long argued that with the addition of the two Canberra class CVLs and the LSD CHOULES navy is lacking the appropriate fire support capability for an embarked land force. Army is under the impression that Navy



The unsuccessful 1991 Toyota Lexcen.

Type 45 Integrated Electric Propulsion

High Voltage Power Generation and Propulsion (4.16kV)



A diagram of the RN's Type 45 integrated power system. This warship power architecture is becoming the 21st century norm for all future warships.

understands its fire support needs. However, naval officers (not by fault) rarely have an appreciation of the “suppression” fire support required to advance an infantry company against a defended position. The strike, support and suppression requirements of a land force will require more than the single/five-inch (127mm) Mk-45 gun on the Anzacs and Hobart class (and ergo SEA 5000). SEA 5000 should try to break free of this situation and explore other naval gunfire support options such as water-cooled rapid fire 5-inch gun, or two Mk-45 guns per ship or even a lightweight 155mm gun.

Limitations on a common F-105 platform continue. The Hobarts are designed to accommodate one helicopter. Given the weight and space requirements of another aircraft needed for the SEA 5000 platform's ASW focus a major redesign will be required again impacting commonality.

The F-105 design is already at its weight and growth limits so future upgrades to this particular platform will be limited and involve significant tradeoffs potentially negating the use of Unmanned Aerial Vehicles and Unmanned Underwater Vehicles, or impacting the ASW role itself.

There is also an Australian preference to omit the SPY-1D phased array radar and AEGIS combat system in favour of the locally produced CEA active electronically scanned array radar (which by all

accounts is actually quite superior) and the Saab 9LV combat system. These requirements will add complexity and make the design even more developmental and unique from the baseline F-105 than might be hoped.

Considering the drawbacks of commonality to the F-105 platform for SEA 5000, and the need to shoehorn 21st century capabilities into its hull let's hope that common sense can prevail and navy doesn't end up with a grey painted Toyota Lexcen!

THE LEAGUE ANNUAL CONFERENCE

On Friday 24 & Saturday 25 October the Navy League met in Canberra for our Annual General Meeting and for a meeting of the Federal Council of the League.

At each meeting of our Federal Council our State Divisions give a report on their activities. The reports truly show the range of activities in which the League is involved.

While this is hardly a complete list, the following will give some idea of the work of our State Divisions. The Divisions' reports included:

support for Cadet Units; efforts to recognize naval service of South Australians at Bitu Paka in 1914 and at Gallipoli in 1915; "think tank" activities; lobbying in a meaningful way for League Navy and Defence policy; lunches including the major annual lunch in Victoria as the venue for the Creswell Oration; a Trafalgar night dinner; a BBQ – described as well attended and spectacular; the Maritime Discussion Group; and involvement and support for the many World War I centenary commemorations.

We have for many years had a representative of the New Zealand Navy League attend our annual meeting. We were pleased to again receive reports on the work of the Auckland and Wellington Branches of the Navy League of New Zealand.

Federal Council received a report on our history project. Considerable progress has been made. It has been no easy task to gather together material stretching back over more than a 100 years. Nonetheless a great deal has been achieved and a first draft of the work has been completed and circulated for comment. Malcolm Longstaff has so far completed 88,000 words.

The development of Navy League website - www.navyleague.org.au was the subject of discussion. The manager of the site has digitised the whole of the back issues of The Navy magazine.

Arrangements have been made to establish the protocol for each State Division to maintain its own sub-site as part of the League site's overall content.

Our meeting was not all discussion. On the Friday afternoon members of Federal Council were given a most excellent presentation "The Multi-Role Warship – Is this the way of the future?"

The winners of the Navy League of Australia 2014 Maritime Essay Competition were announced. In another good field the winners were:

Professional Category

The First Prize went to CAPT George Galdorisi USN for his essay *Defending Our Neighbourhood: Can we guard Australia's Maritime Frontier?* Second Prize was won by Murray Dear, a regular Kiwi contestant, for *The Japanese Submarine Offensive May/June 1942*. The Third Prize winner was CPO Jamie McIntyre for *Taffy 3*.

Non-Professional Category

First Prize was awarded to Kelvin Curnow for *The Renaissance in Aircraft Carrier Construction*. Second Prize to Geoff Crowhurst *The Russo-Japanese War 1904-05* and Third prize to David Rees for *Beatty and the Big Cats*.

A much anticipated segment at each of our annual meetings is the two or three hours spent on Saturday with the Chief or the Deputy Chief of Navy. This year Rear Admiral van Balen, the Deputy Chief of Navy, joined us for the discussion of naval and defence matters. Included among the many topics covered were the LHDs, the future frigate, OPVs, submarines, basing, aircraft and UAVs.

We all thoroughly enjoyed the discussions and are grateful to Rear Admiral van Balen for his contribution to our conference.



The 2014 Navy League of Australia Annual General Meeting class photo. (from L to R) Mr Bill Dobie NZ Navy League; Mr Roger Blythman; Mr Peter Jarvis; Mr Bill Gale; Mr Dean Watson; RADM Michael van Balen RAN, Deputy Chief of Navy; Mr Trevor Vincent; Mr Graham Harris Federal President Navy League; Mr Harvey Greenfield; Mr John Strang; Mr John Jeremy; Mr Malcom Longstaff and Mr Robert Albert.



Federal President of the Navy League of Australia (left) presents Commanding Officer of Navy Headquarters Tasmania (NHQ-TAS), Commander Stacey Porter, the (surprise) Navy League of Australia Community Award with Rear Admiral Stuart Mayer, CSC and Bar, RAN (right). (RAN)

Each year at our annual meeting Federal Council decides on the winner of the Navy League of Australia Perpetual Trophy – Community Award. This award is given to the RAN ship or establishment which in the opinion of Federal Council has made the best contribution to their community.

This year 14 ships and establishments nominated for the Award. This number was reduced by the Fleet Commander to a shortlist of three. Of those three Federal Council chose Navy Headquarters – Tasmania. The decision was unanimous.

Since it was instituted in 1981 ships and establishments of varying size have won the Award. NHQ-TAS is believed to be the smallest winner yet. By way of contrast in 2013 the winner was HMAS STIRLING (Fleet Base West).

Despite being few in number the team at NHQ-TAS managed to get a lot done. The types of assistance provided to the Tasmanian community were many and wide ranging. Space precludes me from listing them all, so I will mention just two activities that caught my eye. The CO participated in the CEO Sleepout. Overnight outside on a June night in Hobart. It struck me as a bracing way of raising money for St Vinnies. And Painting. I had thought that there was rather less painting done in the RAN these days. NHQ-TAS team members have been involved in painting at a crisis accommodation centre, at a Surf Lifesaving Club and at the Hobart Regatta Showground.

The above mentioned activities are just a sample of the many conducted by NHQ-TAS throughout the year in support of their community. Well done NHQ-TAS. It was an excellent conference. We are all looking forward to next year.

Presentation of the Navy League of Australia Perpetual Trophy – Community Award

The Award was presented to NHQ-TAS at Anglesea Barracks Hobart on 7 November 2014.

It was so arranged that no one in Hobart knew of their win. Rear Admiral Mayer, the Fleet Commander, was ostensibly there to present awards to various officers and sailors. At the conclusion of the awards ceremony the Fleet Commander informed the gathering that he had just released a signal announcing that NHQ-TAS was the winner of the Navy League Community Award.

At that point I ceased to be “an old friend of the Admiral” who had been invited along, and was introduced as Navy League President. The Admiral and I then made speeches and presented the Award.

The Admiral was delighted with the success of his subterfuge. It was indeed a great success and the recipients were truly thrilled to have won. The surprise element in the announcement seemed to add to the occasion and to their delight. The Award was well deserved and a tribute to what a small enthusiastic team can achieve.

JSF CHALLENGES FOR AUSTRALIA'S LHDS

By Mark Boast

The best way to overcome a challenge is to understand it. With this in mind *THE NAVY* is reprinting former Sea Harrier squadron Commander Officer Mark Boast's article from 2010 looking at the challenges that could confront the ADF adopting organic F-35B STOVL JSF for the new Canberra class LHDS. As forewarned is forearmed it is hoped this article can assist with providing a greater understanding of the issue of putting the JSF on the LHDS for the upcoming Defence White Paper.

The acquisition of two LHD ships within an expanded amphibious capability has naturally stimulated thinking within the Defence community about the best force mix to support the capability (*Editor* – in fact most recently through Prime Minister Tony Abbot). In particular, there has been much speculation about the potential for operating fixed wing aircraft to provide enhanced offensive capabilities in air and surface environments; a natural path given that the basic ship configuration so clearly reflects its evolution as a STOVL jet platform.

The Australian operational concept for both LHD ships is focussed on amphibious operations and currently does not include an organic fixed wing aircraft capability that operates from the LHD or within the deployed amphibious force. This has left open the traditional questions about the need for organic offensive fixed wing aircraft capabilities where land based air assets may be limited due to range or response times, and other organic assets such as Tiger attack helicopters are relatively limited in their offensive roles, range and firepower.

In order to simplify the approach and get straight to the organic fixed wing aircraft discussion, I am going to assume that the Prime Minister has requested the ADF to provide some initial key discussion points on the development of a fixed wing offensive air support capability to operate from the LHD ships for the upcoming Defence White Paper. I leave it to others to ponder on the Prime Minister's request and reasons for it!

The purpose of this article, therefore, is to explore some of the fundamental operational and support implications of an organic fixed wing aircraft capability.

There is no intent here to question a similar land based air capability or the role and contribution of an embarked ARH Tiger. If it eases the reader's concern, consider the Prime Minister's request as being one based on risk reduction for the more demanding offensive land and maritime scenarios, or as a "peace of mind" force protection requirement for the future.

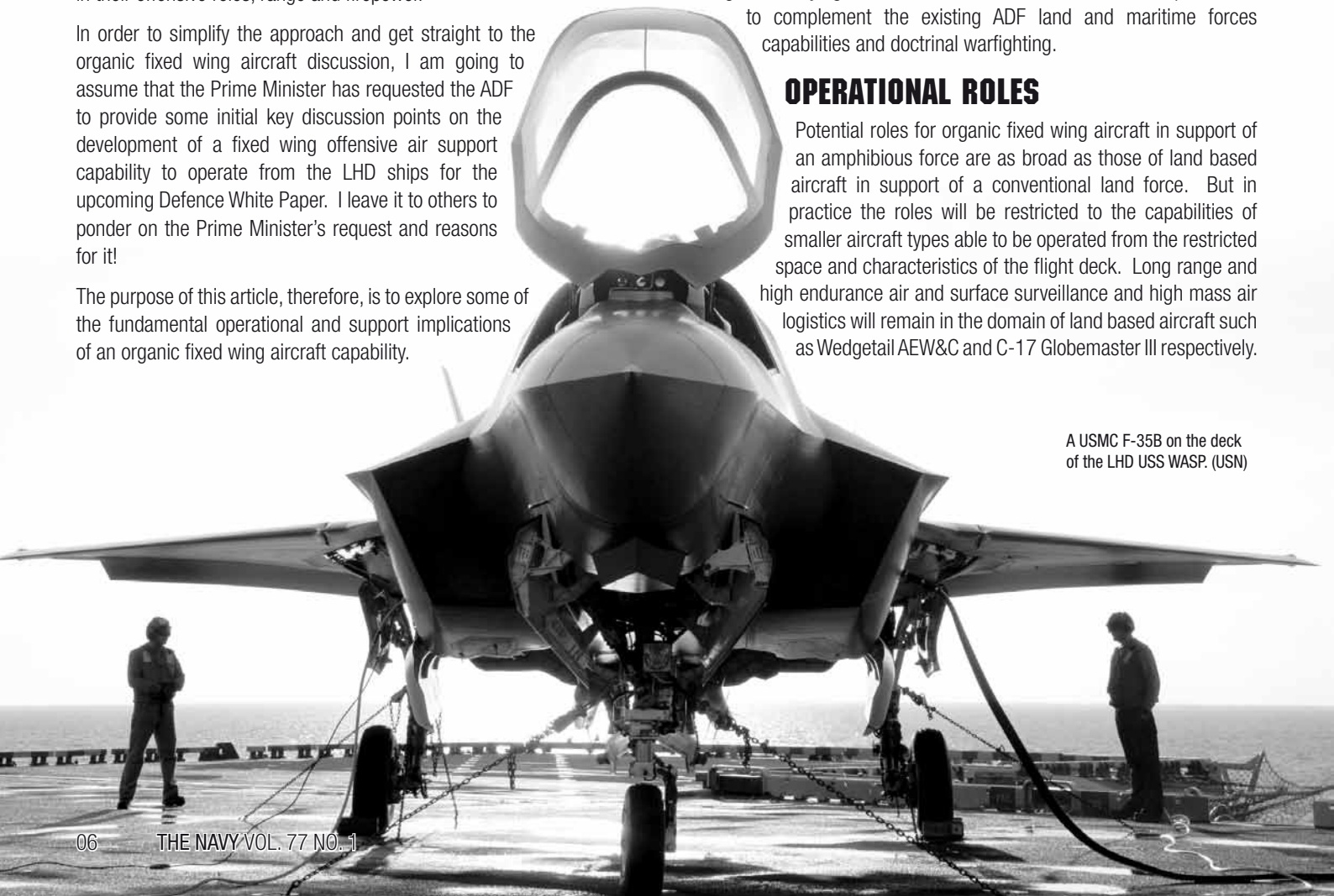
THE ORGANIC FIXED WING AIRCRAFT CAPABILITY

The organic capability is defined as one that is able to operate and support fixed wing aircraft from either or both LHDS in support of warfighting operations. The conventional model of embarked Squadrons or flights involves a sufficient number of aircraft that can be operated sustainably to be ready for warfighting when required, armed with appropriate weapons, operated by suitably trained personnel and able to be reliably planned in support of operations. Twenty-four hour operations and poor weather/night time flying must be considered as fundamental requirements to complement the existing ADF land and maritime forces capabilities and doctrinal warfighting.

OPERATIONAL ROLES

Potential roles for organic fixed wing aircraft in support of an amphibious force are as broad as those of land based aircraft in support of a conventional land force. But in practice the roles will be restricted to the capabilities of smaller aircraft types able to be operated from the restricted space and characteristics of the flight deck. Long range and high endurance air and surface surveillance and high mass air logistics will remain in the domain of land based aircraft such as Wedgetail AEW&C and C-17 Globemaster III respectively.

A USMC F-35B on the deck of the LHD USS Wasp. (USN)





A USMC F-35B during weapons testing. Here the aircraft is dropping a 500-lb laser guided bomb. The F-35B will take the full range of US air weaponry, and ergo RAAF. (USN)

These capabilities are mentioned here because they will continue to be required even if the LHD develops its organic fixed wing capability.

Similarly, Air Refuelling and the additional land based offensive aircraft that it enables will always play a vital role in providing the numbers and breadth of battlefield coverage that a small number of embarked aircraft will never be able to meet. Beyond the scope of this discussion but not far from the back of the mind is the apparent irony of our current fleet of naval F-18 Hornet and Super Hornet aircraft. But again the size and characteristics of the flight deck dictates feasibility.

For ease of discussion, and to remain true to the PM's request, I will assume that the required primary role is for a fixed wing land attack air capability in close support of amphibious and associated deployed forces. Given today's mobile forces and the inherently remote nature of amphibious operations, this support extends to a strike capability against influential targets that are not in the immediate battle areas. In making this assumption I am keenly aware of the many solutions that exist and are under development to support this role besides the well know aircraft currently employed. Long range naval gunfire and missile systems, long range land based air systems including UCAVs (uninhabited Combat Aerial Vehicles), and the increasingly lethal weapons within the amphibious force itself will eventually need to be taken into account to determine the force mix options.

A secondary role is the provision of a supplementary maritime offensive capability against air and surface threats. Whilst a secondary role, this consideration falls into the requirement of most deployed assets to provide as much value to the force as possible. This role is more about complementing and supplementing capabilities such as the Hobart class destroyers and long range land based systems rather than replacing them. At sea there is rarely too much force protection available and the RN's lessons in the Falklands Conflict provide ample proof should there be any doubt.

Roles that I will not investigate are those that would not normally be solved by a STOVL jet. Nevertheless they are worth mentioning. Air and battlefield surveillance is an essential capability and one that our own Wedgetail and allied assets can support. In order to meet persistent coverage and support surge or unpredictable demands however, an organic capability may need to be considered. Its value will not be measured by its limitations when compared to that provided by a large fixed wing aircraft, but by its rapid availability to

fill gaps and cope with unexpected availability of the larger assets. Again, the lessons of the Falklands Conflict are applicable and especially the challenge of conducting amphibious operations at extreme ranges of land based aircraft.

The question of an organic fixed wing capability is a complex one. In the spirit of simplicity and in keeping with the intent of the PM's question, I will approach this discussion using only three criteria: the aircraft, the weapons, the organisation and culture.

THE AIRCRAFT

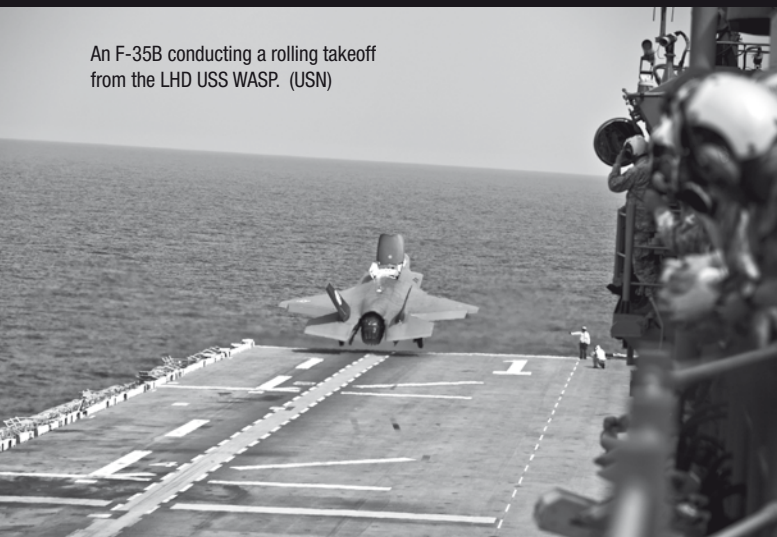
The provision of land attack by an organic STOVL jet requires some fundamental enablers. Deck and hangar space that support flying and support operations, weapons stowage and assembly areas, accommodation for associated personnel, ship technical and operations systems to support flying, and a training system to provide an effective, deployable and safe capability. The majority of these enablers come at the cost of space, utility and cost within the strict boundaries of the ship environment. Whether above or below deck, the aircraft will displace other aircraft, amphibious force elements or stores. The weapons will require appropriate storage, handling and assembly areas. The personnel will need a certain amount of appropriate accommodation that will probably displace others who may have been assumed in the full warfighting configuration. The aircraft will require appropriately equipped workshops while in the hangar and finally, flying operations will need the communications and instrument approach aids whilst flying.

These requirements are unsurprising and distil into being competition for

Vertical landing Sea Trials aboard USS WASP. The engine control system on the F-35B makes vertical landings much easier and safer than the older AV-8B Harrier. Some deck resurfacing using a different material is needed to accommodate the engine exhaust but that's known and easily applied. (USN)



An F-35B conducting a rolling takeoff from the LHD USS WASP. (USN)



space with the confines of the ship's design. What may not be apparent is that the nature of fixed wing flying that includes rolling take offs, high thrust vertical landings and the presence of weapons will dominate the ships flying operations. Nor will this domination diminish during amphibious operations when the natural tendency will be to support intensive helicopter operations. Even ships position, heading and speed will default to the fixed wing flying operation, albeit within the generous flexibility that STOVL capabilities provide and far less extreme than that which would be required for a conventional (non STOVL) naval fixed wing aircraft.

But back to the space competition. In the first instance it is worthwhile considering the number of aircraft that may be required and their "residential" requirements; the amount of time the aircraft are embarked and when they may not be present.

Let me immediately constrain the discussion to two STOVL jet aircraft types based on feasibility and the ADF's acquisition plans respectively. The first is the Harrier AV-8B family and secondly the STOVL F-35 JSF. Both these single seat multi role aircraft have been taken into account in the development Australia's LHD design, given their Spanish predecessor, and therefore are valid for this discussion. But it is important to remember that neither aircraft has been or is currently planned to be in the Australian inventory (editor – 2015 White Paper yet to publish). Whilst still under development, the STOVL JSF has perhaps the greater application in the

longer term as it is a more specialised (and expensive) version of the land based JSF already being planned for the RAAF. Before going further I have already assumed that the reader is aware of the tremendous impact that catapults and arresting gear would have on the LHD design and that such an option is well outside the spirit of the PM's question, and probably that of engineering feasibility as well.

Aircraft of this type are operated in pairs. This doctrine has been developed from experience in the conduct of operational tactics, self protection and mission assurance. Individual mission planning will therefore always include two aircraft plus a further one at least as a "spare" in the event one of the planned aircraft suffers an unserviceability prior to launch. Depending on the criticality of the planned mission, the "spare" may be manned or their may be a further "spare", manned or unmanned. Assuming that there will be critical missions in a land battle associated with amphibious operations, then we can assume that four aircraft equipped with weapons will be the minimum number required "on deck".

From this fundamental assumption, the increase in STOVL jet numbers is driven by issues such as aircraft maintenance cycles, the battlefield coverage required (numbers and time), and secondary role requirements. A simplistic answer to the question of how many aircraft on the ship required to provide a reliable capability is four ready to fly, one in the hangar in maintenance, and if required a further pair to provide additional land attack or maritime force protection. Depending on aircraft reliability and maintainability, it would not be unrealistic to expect that between six and eight aircraft would be required on board to provide a sound capability base. These numbers would not be unfamiliar to current AV-8B operators, most of whom are operating these squadron sizes from ships in the twenty thousand tonne category i.e. smaller than the Canberra class LHDs.

STOVL jet aircraft are deliberately designed to be able to be operated from a range of airfields and landing pads. Therefore it is feasible to consider that the aircraft may disembark to shore operating locations. These locations may be either runways, landing pads, or combination of both. Whilst STOVL jets have excellent operating characteristics from surprising short runways, landing pads entailing vertical take off and landing have constraining limits. The operational usefulness of pads is highly dependant on the vertical lift capability of the aircraft. The lift capability is determined by overall aircraft weight, air temperature, and pad material/design. When equipped with weapons and fuel, both the



The moment of lift off. As the USN has no ski jump on its LHDs the aircraft transitions to vertical lift before the end of the deck. (USN)



At sea trials of the JSF's ability to integrate with a moving deck at sea. The USN/USMC already has a wealth of information on JSF integration to a LHD which Australia could take advantage of. (USN)

AV-8B and JSF have severe limitations when taking off vertically. These limitations disappear rapidly with even the shortest of runways and therefore disembarked operations should normally be regarded as only achievable from runways - albeit from runways much shorter than may be required from conventional jets. But a far more problematic issue limits disembarked operations in tactical theatres. The support requirements for the aircraft include people, fuel, weapons, maintenance equipment, domestic accommodation...and so on. Unless provided fully or in large proportion by the disembarked location, all this will need to come from the aircraft's normal operating location, the LHD! For the sake of this discussion that is limited to amphibious operations support, the aircraft and their support will most likely be a permanent presence on the ship with at best, occasional diversions to shore locations should they be available.

THE WEAPONS

Fixed wing roles such as CAS (Close Air Support), Strike and Air Defence cannot be achieved by the aircraft alone; the weapons are the essential element. The subject of weapons on both ships and aircraft is both complex and demanding. Being ship based we will want a sufficient range of weapon types and numbers to do those tasks which by default can only be accomplished reliably by the organic aircraft. And in the amphibious role, the usage rate of air to surface weapons can be very high in order to maintain the edge in force protection and progression of the ground battle.

Whilst the trend in developing smaller and highly accurate weapons may mitigate some magazine and handling space requirements, there will always be highly desirable weapons with longer range, endurance and payload that require large stowage areas. This requirement can be exacerbated if the weapon or its major components are designed to be stored individually in its own container. The storage and preparation spaces will therefore need to be scaled accordingly and also be equipped with the range of machinery and specialist manpower to support the potentially high usage rate.

Multiple magazines are very demanding on ship design and it is inevitable that painful compromises will be required with competing weapons storage requirements such as those for the embarked land forces. Stowage incompatibility between weapon types based on characteristics such as explosive content, propellant type and "cook off" times will also complicate the number and types of magazine required. Weapons stowage requirements can be very difficult or even impossible to restore to an existing design unless they were taken into account at final design acceptance. Whilst some examples can be recalled of seriously

compromised weapons stowage due to unexpected operational demands - the on deck stowage of air weapons by the RN during the Falklands War is a recent example - it would be unwise to plan on this as the LHD will need to operate close to land and therefore be closer to possible threats. And not to mention that the deck area will be a very complex operating environment during actual amphibious operations - organic fixed and rotary wing, visiting aircraft, landing craft operations, maximum communications effort and fully alert defensive systems! Not the time to have weapons exposed on deck unnecessarily.

Depending on the weapons use predictions and stowage capability, replenishment of weapons at sea will probably be required in order to avoid lengthy and highly inconvenient transits of the LHD to suitable shore based facilities. Whilst a number of smaller weapons could be re-supplied rapidly and reasonably easily using helicopter vertical replenishment, larger mass weapons and those with bulky storage cases will require conventional Replenishment at Sea. But where will the weapons come from? Not only will there need to be at least one suitable replenishment ship, but its supporting shore infrastructure will need to be matched to providing the weapons re-supply for the LHD capability. Transit times between potential operational theatres and suitably located and equipped shore facilities will probably be critical in supporting an amphibious role, especially if the organic fixed wing capability is the major enabler for sustained land operations.

THE ORGANISATION AND CULTURE

Finally it is time consider what is arguably the most difficult and complex topic within the Australian context, the fast jet organisation and its culture. Unlike the first two topics, the cultural issue is at it suggests, primarily one based on people and organisations rather than technical issues.

Let's start at the beginning. The RAAF is the only operator of fixed wing offensive aircraft within the ADF. Within the current configuration of the ADF air forces, it would seem a logical and mandatory assumption that an organic fixed wing capability on an LHD would be an RAAF Squadron complete with required air systems support personnel. Within the limited environment of the LHD there would of course be challenges to accommodating the air personnel as well as providing them with the training and experience to be able to operate in the ship environment. But given the high quality of ADF personnel and the attractive challenge of introducing such a potent and visible capability, it is highly likely that integrating an RAAF Squadron into the LHD environment would not be the limiting risk that some might imagine.

A single embarked squadron capability would itself need the support of a land based squadron to provide the training throughput of aircrew and maintenance personnel as well as providing the continuity and surge potential to reliably support operational tasking. Given that the embarked squadron may only be six - eight aircraft it should not be assumed that the squadron sizes would be equivalent to those currently found within the RAAF's fast jet force.

But what of the impact of supporting an organic maritime fixed wing capability to the RAAF itself? Within the timescale of this discussion, the RAAF is already operating two different fast jet types and will continue to be severely challenged to maintain the manpower to support existing capability and the transitions to new capabilities. The personnel challenges are significant and expensive to resolve. Pilots, engineers, systems maintainers and air operations specialists will all be required and dedicated to the maritime role. Luckily there are existing organisation models within the USMC and RN/RAF that could be adopted but the

inevitable truth is that whichever organisational model is adopted, or developed, the new organisations will be a clear addition to the existing RAAF fast jet force and not just a variation.

Perhaps the toughest challenge that an organic fixed wing capability will present is to those who fund, design and maintain the shape of our defence force. Developing the capability with a "least impact on funding and organisation" basis will inevitably fall to the RAAF first as a new aircraft type will be required. The existing fast jet fleet would need to be re-assessed, ongoing operational outputs revised and the surge associated with introduction of a new capability would require manning and management. Given the relatively limited size of the RAAF and especially the fast jet force, such a change would be highly dramatic and it might be unrealistic to expect that the RAAF could shoulder the entire load itself, especially if a balanced national defence capability is to be maintained throughout the transition period to the new capability.

Up to now I have assumed that the significant change would be managed using a conventional force restructuring i.e. adapting existing forces and managing a coordinated transition with least impact on ongoing defence capability. But there are other options. The ADF could "adopt" all or part of a foreign Squadron and support structure to provide an instant initial capability, commence ADF training transition and enable early effective operational assessment. Alternatively and perhaps more feasibly, the ADF capability could be grown through developing it overseas within the existing organisations of either the UK or US and then transferred to the LHD when sufficiently mature. Included in both these options would be those ship based personnel essential to embarked flying operations mentioned earlier.

Regardless of the approach taken, a most critical step in transition will be the integration of the fixed wing capability into the LHD. Where organic fast jet capabilities exist there are also dedicated organisations that provide the training and assessments to ensure least risk during transition. This vital step would most safely and coherently be achieved

through the training systems already in use by whichever foreign defence force is supporting the development of the air capability. The LHD will therefore need to plan on a significant period in either US or UK waters whilst the fixed wing capability is developed onboard and brought up to an operational employable level. To be able to achieve an operationally significant capability including day/night/poor weather with reasonable experience level will be a significant activity probably requiring between six months and a year.

CONCLUSION

So given the consideration of only three assessment criteria; aircraft, weapons and organisation and culture, what does a potential response by the CDF to the PM's question look like?

"Well Prime Minister, to start with we need to purchase at least one squadron of approximately 12 STOVL aircraft and training systems; train the pilots on a variant of an existing aircraft; develop our engineers and flying operations people overseas with one of our major allies, which we've done before, and integrate the new squadron onto the ship overseas using our allies support for up to a year. Needless to say this will have an impact on our existing plans within the RAAF fast jet force and those for the LHD, but we have excellent people and with careful management it is certainly achievable. When would you like to see 1st Pass?" ■

Mark Boast is a former naval aviator of 23 years experience in both the RAN and RN. The majority of his flying was on the Sea Harrier where he was CO of the training squadron and operational evaluation unit. He was also an MOD staff officer for the Sea Harrier replacement and was involved in the concept development for JSF and CVF.

Opinions expressed in this article are entirely his own and developed without reference to any ADF project including the LHD and JSF projects. Some updating has also been carried out by the Editor.

Six JSF. Even having only six 5th generation supersonic stealth fighters on just one of Australia's LHDs would provide a quantum leap in capability and a wealth of options for future governments to any international security incident. (USN)



AN OCEAN FOR MY KINGDOM

By Robert Cuthbert Blake

This remarkable account of the early beginnings of HMS OCEAN's rise to become an unlikely Flag Ship of the RN should hopefully provide food for thought for the RAN's introduction to service of its Canberra class LHDs and not repeat the mistakes of the RN.

The story of HMS OCEAN has probably not yet been fully told – from humble origins as a sea transport Ro-Ro vessel to get an Embarked Military Force (consisting of British Army / UK and Netherland Royal Marines) on their one-way ticket to Norway¹ and back after 30 days, to Flagship of the Royal Navy. It was never intended or designed as such. Hence in this story of the ugly duckling – for by any stretch of the imagination OCEAN is an ugly ship compared, say, to HMAS CANBERRA and ADELAIDE – there is a degree of poignancy and greatness. Like any story of a ship, OCEAN reflects the technology, the crew and social dynamics of the time. She would not be designed and built today – and therein lies the greatest pity. For, at its heart, OCEAN was an experimental ship based upon a principled understanding of Amphibious Warfare and a desire to get the Royal Marines back to sea in their own dedicated ship. This paper examines the OCEAN story from its bastard birth through build to gaining its operational spurs and, ultimately, to Flagship. Her wider application and current role was never by design or initial intent. The sadness is that the lessons of her being were never learned by the UK and it may now be too late for the Royal Navy to do so.

INAUSPICIOUS BEGINNINGS

Britain in the 1990s was 'another country'. The greatness of the Thatcher years – for those of us who remember the 1970s there was a profound greatness to her achievements – had been eclipsed by the end of the Cold War (brought about by the remarkable rapprochement² enabled between Mrs Thatcher, President Gorbachev and President Reagan); the first Gulf War; the early 1990s recession and the dismal John Major Governments with its failure to intervene with France effectively in the emerging Bosnian conflict. Within the failure of UK to engage in the Bosnian conflict³ lay also the seeds of what would become HMS OCEAN. As is so often the case in British History, OCEAN was essentially an emergent warship building upon the skills and competencies and drive of a small number of principled and dedicated senior officers – more by accident than design. In the case of HMS OCEAN, she owed much of her existence and final designs to a senior and much respected Royal Marine Officer whose aim was to get the Royal Marines back to sea in their own, dedicated warship. If you have ever wondered why OCEAN has a Phalanx proud and centre on its bow, it was to prevent a ski-jump

HMS OCEAN with HMS ILLUSTRIOUS in the background. With the decommissioning of the Invincible class carriers OCEAN has now taken on the role of Flagship of the RN. Something she was never expected to do. (RN)



being placed there – so constraining, by design and build, the ship's role to that of a rotary wing platform. This was both a blessing and a limitation as future events unfolded.

The design of HMS OCEAN was in every sense a bastardisation. Its hull ultimately took from the designs of the Through Deck Cruisers HMS' INVINCIBLE, ILLUSTRIOUS and ARK ROYAL – now all sadly decommissioned as a result of the UK's disastrous and poorly thought out 2010 Strategic Defence Security Review (SDSR). Disastrous for four specific reasons to do with the fundamental failures of the UK MoD and its political classes: first, just as other nations were moving towards a form of Asymmetric Offshore Counter Balancing (AOCB) and a reinforcement of maritime force structures the UK did the opposite; secondly, the UK took the decision a) to get rid of its remarkable GR-9 Harrier Fleet Air Arm capability (and its pilots) in favour of Typhoon and the RAF; b) to cut back proportionally much more on the RN than the other forces and, c) to continue investing in poor, (militarily, industrially, politically or economically) unaffordable and over expensive designs such as the Type 45 and Queen Elizabeth Class aircraft carriers, which, HOOD-like, will never deliver more than the sum of their parts and will be obsolete from the day they finally enter service. Both designs being simultaneously too big (for what they are intended for) and too small (to survive the challenges of 21st Century warfare). In many regards, the decision to get rid of the Harrier Fixed Wing Capability – during a last weekend botch of the SDSR by the PM, then Chief of Defence Staff (an Airman) and a major manufacturer with nothing more to be had from the Harrier – bore the hallmarks of the decision to get rid of the TSR-2 Tactical Strike/Reconnaissance aircraft in the 1965 Defence Review. As per the orders of the then UK Chancellor (Dennis Healy), the jigs for the TSR-2 were dumped in the mid-Atlantic trench to prevent any hope of rebuilding. A form of Soviet-Marxist, Turnpike economics for brutally re-capitalising labour by maximising capital investment in alternative export markets. In the case of the Harrier, the FAA and RAF pilots were sacked and the GR-9s – the preferred weapon of choice (flown by Navy and Marine (USMC / RM) pilots) in Afghanistan – were broken down into parts and essentially gifted to the USMC for parts. There is another story to be told and the capability could have been kept alive – both pilots and machines – to be available in need / for the QEII class but this was



HMS OCEAN at sea with Royal Marine, Army and RAF helicopter assets embarked. (RN)

refused by the MoD, the Treasury and its elite senior public servants and incompetent politicians. The Harrier may as well have been buried alongside the TSR-2 in the mid-Atlantic.

I digress, while the hull took on the form of an Invincible Class Carrier, its fittings decidedly did not. In many regards the ship got the worst of both worlds: the minimum of Naval Engineering Standards and those required to keep the ship in class by Lloyds Register. For example, watertight boundary requirements were less than those expected of a warship; while accommodation standards were less than those then being applied for commercial shipping. Despite the shipbuilder indicating that they could provide at the same cost civil-type accommodation for the crew and embarked military force with more bathrooms and comfort, this was turned down by the then MoD Procurement Executive (PE) in its pursuit of Naval Engineering Standards! It is also important to recall that the ship was being built in the late 1990s, no office skyscraper then under construction would not have been fitted with a copper or even fibre-optic LAN. Yet no such provision was made for OCEAN, so requiring very expensive post-build retro-fitting of cables and watertight, through deck glands at 20-30 times the cost of fitting during build.

Finally, for those of us old enough to remember the company Swan Shipbuilders on the Tyne (that built the last HMS ARK ROYAL), the cost of political shenanigans at the time and a drive to beggar thy neighbour economics, led to the receivers being called in when the UK government awarded the contract to VSEL. Subsequent investigations into the decision to award the contract to VSEL suggest that two different philosophies were at play: one adopted by VSEL that the design 'was a merchant ship with military hardware bolted on'; the other taken by Swan Hunter, that this was a military vessel. Both assumptions were right and wrong – the result was that many of Swan Hunter's finest shipwrights and designers ended up crossing the Pennines and working for VSEL in Barrow (where OCEAN was fitted out; its hull having been built in the Kværner Yard on the Clyde).

DECIDEDLY NOT THE FIRST XI

Charles Handy, the Irish organisational-behaviour philosopher, maintains that if one manufactured a First XI, then it would be unlikely to function as a team, essentially because each player would be competing for the same resources and one would end up with unhealthy hyper-competition. Sounds a bit like the current Wallabies, perhaps? The first plank holders (or crew) of HMS OCEAN were decidedly not from the RNs Top Drawer; in fact quite the reverse. As one Midshipman put it shortly after the ship



A UK Army Apache gunship helicopter flying past HMS OCEAN during the recent Libyan operation. With no proper carriers with Harriers available OCEAN embarked attack helicopters and deployed off the coast to Libya to impose some sort of battlefield effect on the Libyan government forces. (RN)

was launched (and after its first operations under the Red Ensign, following Hurricane Mitch), 'all the officers [including at least one of the Officers Under Training] had been Court Martialled, Decorated and or both'. The same (not from the Top Drawer) was not necessarily the case for the Royal Marine Officers (other than Decorations and Court Martials) – although, in truth, many RM Officers were quite content by their focus on Land Centric operations in the Balkans and in Northern Ireland, and had rather taken their eyes off the Amphibious Ball. What one had, though, in HMS OCEANs' first crew was a remarkable degree of sheer professionalism and a determination to understand the amphibious systems and make the ship work – supported, also, by a functioning (in the parts where it counted) MOD PE; Defence Research Base and shipbuilders.

By 1998, despite some setbacks and delays, HMS OCEAN was ready to sail from Barrow but MoD PE and the Shipbuilder – for various contractual and indemnity reasons – were dragging their feet in terms of releasing the ship to the RN for its Part IV Trials. This may sound rather familiar – noting, though, that in the case of HMAS CANBERRA the crew were not allowed on board during the same stage in its build programme. However the First Crew may be described as 'Old Navy' and particularly the Commander, who had been with the ship from the start. A penalty of long builds with crews standing-by in non-Base ports is that sailors have a tendency to 'go native'. In other words, they start enjoying the comforts of being ashore rather too much! So the Commander was effectively resisting three forces: the comforts of sailors-gone-to-shore; the senior naval marine engineer officer's focus on quality and command (in build), which he would rescind on the ship going to sea, and the MoD PE / Builders reluctance to let the ship go. The Commander, in true Nelsonian fashion – with the full support and connivance of the then First Sea Lord, Sir Jock Slater – cut OCEAN free of Barrow and, despite all the threats and warnings, sailed for Portsmouth. It was to be a short but important operational test, ending in Portsmouth for an emergency docking when a misaligned shaft was replaced and repaired.

From the start, there was an air of independence and the rogue in the semblance of HMS OCEAN and its various crews. The MoD PE lead was particularly frustrated by the fact that OCEAN had been cut out of Barrow and, the more so, that the Crew had created a close working relationship with VSEL that was actually driving the designs and fitting out of the ship; so excluding the MoD PE and its rather out-classed project managers. This came to a head shortly

afterwards when the ship had to be evacuated on the failure of the Sewage Treatment Plants, which were exuding Hydrogen Sulphide into bilges and passage ways. The then Chief of Defence Procurement (CDP) – an Engineering Admiral – decided to pay an impromptu visit and swept down like a dark gull onto HMS OCEAN. He was met at the brow by the Commander and Captain and escorted to the wardroom to meet the Heads of Department for 'coffee and biscuits'. It soon became clear that this was not a meeting for coffee and biscuits – rather a tendentious, headmaster-type one-way transmission. The Commander, one of those wonderful Irish trained Lawyers, was not going to take this nonsense lying down – and rightly remonstrated, only to be told that he (The CDP) 'would have the Commander removed if he spoke out again'. Having delivered his delightful homily, the Admiral stormed out of the Wardroom to be escorted off the ship by the CO and Commander (still veritably shaking from the encounter). We humbled few gathered quietly in the wardroom pouring a stiff Plymouth Gin (neat of course) and finishing off the biscuits. The newly joined Commander Marine Engineer, having first had to evacuate the ship, was ashen – certain that his glittering career was now over. The Commander returned fuming and muttering dark threats about incompetent senior engineers and their ilk – and gratefully accepting a Plymouth Gin. Father, a seasoned FAA Test Pilot who had stood by the Merlin Helicopter, came jauntily into the wardroom (having gained permission from the Commander) and looking towards us all said 'well I think that all went frightfully well!' It was what was needed – Father was clearly articulating that 'as far as Royal Navy, he and the First Sea Lord (in others words those who counted in the operational food chain) were concerned, we were doing all right'. The colour began to return to CMDR ME.

This was not the first and neither was it the last time that HMS OCEAN was to be confronted by managerialist, methodologist, Gramscian-Marxist, rent-seeking, pen-pushing nay-sayers that now so sadly dominate in UK politics, the elitist senior civil service (many with Oxford PPE type degrees, like the polities) MoD, research, procurement, industry and the RN. But this was nearly twenty years ago, when the spirit, thinking and designs of Blake, Nelson, Fisher, Cunningham and Fraser had yet to be driven out of the Royal Navy. Forever people were telling the First Crews that 'HMS OCEAN could not (e.g., take CH-47 Chinooks)', 'would not ever do this that and the other (e.g., deploy Attack Helicopter as the Platform of Choice)' and 'was never intended, designed to do otherwise (e.g., as a Flag Capable Platform)'. In every



HMS OCEAN off the coast of Libya with the French LHD TONNERRE. (RN)



HMS OCEAN moored in Greenwich, London for the 2012 Olympic Games.

particular regard they have been proven wrong. Yet in the summer of 1998, as HMS OCEAN finally made its way up Plymouth Sound to its Base Port, the welcoming could not have been more under-whelming. Despite being one of the most important ships to enter the Royal Navy since the 1980s, there was not one call-round for officers and senior ratings from the assembled ranks of Frigates and Destroyers then alongside. Not one. Rather, there was a combined critique about the loss of their dockside wharfs to make room for HMS OCEAN.

OPERATIONS AND BEYOND

HMS OCEAN sailed that autumn of 1998 to complete its Part IV operational sea trials in the West Indies. The ship has been operational ever since, from being redirected to support humanitarian relief operations post Hurricane Mitch off Nicaragua, through to Sierra Leone (I and II); the Amphibious Assault of Afghanistan in 2002; the amphibious led sweep through the Al-Faw peninsular at the start of the 2nd Iraq War; to Libya; to support of operations in Afghanistan and Iraq through to today and becoming the Flagship of the Royal Navy. One of those things we were told 'would never happen'. Critical to the success of this was a principled design and understanding of three component systems: the Air Traffic Control Systems (ATCS); the Explosives Support System (ESS) – including the proving of the Lynx-Tow missile combination from sea – and the Communications Support System (CSS), including a satellite TV system gifted to the ship by Sir Donald Gosling (of UK NCP fame) and fitted by the crew, which proved to be an essential morale and strategic communications force multiplier during Sierra Leone; incorporating Flag and EW (Cyber) systems. Each of these systems had to be integrated and each was designed and built in situ (by the first crew) – something we were blessed by the support of other Services (and those pockets of excellence in MoD PE and Defence Research (before it became Dstl and QinetiQ) then in existence) and excellent Captains in doing. The ATCS is more important in an LPD or LPH, since one is dealing with soft-skin aircraft such as helicopters and the radars (then / still in use) were not designed for such purposes; had blind spots, complicated by the fact that there were not enough dedicated frequencies to achieve positive control of more than a few helicopters at a time. None of this was truly appreciated on build – and led tragically to the loss, in 2003, of two Sea Kings operating from HMS ARK ROYAL off Iraq. Despite the warnings from HMS OCEAN's experience and near identical ATCS, the 2007 Inquest was told:

A Royal Navy air traffic controller did not warn the pilots of two Sea King helicopters they were on a collision course because he thought they could see each other, an inquest into the worst accident involving

British service personnel in the Iraq war was told yesterday...the radar on the carrier ARK ROYAL often showed aircraft to be closer than they really were: "Although it looks like they are flying towards each other, they can miss each other by a considerable margin".

Ultimately, the HMS OCEAN design was not bold enough. It was a step in the right direction, to move radically towards what has been described as Versatile Modular Systems (VMS) where the platform is largely separated from the systems and commercial (where possible) dual-use design are used – thereby retaining the sophistication in systems integration and hi-tech and the affordability provided by perfectly viable commercial platforms. HMS OCEAN was also designed with a 15 year life (then extended to 20 years). By maintaining such a tempo, one drives out Defence Cost Inflation; retains skills and maintains affordability and numbers in the design and class. HMS OCEAN should have been decommissioned between 2010 and 2014, based on original designs. Instead she is being extended at additional unfunded cost to provide a stop-gap until the QEII class finally achieves Full Operational Capability, if ever. The key lesson was that HMS OCEAN should have been replaced by a fully VMS Design – in numbers – based upon Container Ship type hulls / engines and sophisticated, bespoke modularised decks, weapons systems and crews. The designs exist and, what is more, for the cost of two QEII's, UK could have purchased a Fleet of over 100 Ships (Flat Tops; Heavy Lift and FF/DD/MCM) – crewed under the Three Fleets Model; funding raised through a costed commercial model. In other words, the VM Fleet would be scalable and replicable –and would be what we were doing today if we were at war, like the first HMS ARK ROYAL carrier! Since UK is bankrupt and at war (without understanding the war it is fighting), the mystery is why these designs have yet to be taken up. Perhaps HMS OCEAN's first crew was also to blame – for identified by some of the expert Scientific Civil Servants at the time, they engineered the ship into something it was never designed / intended for.

Finally, RAN has also gained from the HMS OCEAN experience and the tragic demise of the RN, for amongst many of the Lateral Transfers joining the RAN are those who cut their teeth in HMS OCEAN as Royal Navy and Royal Marines. These are some of the finest Officers, Marines and Ratings to come from the UK and the ADF has an opportunity to build on and develop their skill sets as we build our own Amphibious Force. But looking beyond CANBERRA and ADELAIDE, RAN also need to take forward VMS designs and crewing models of its own as it seeks to maintain and pacify the vast reaches of the Pacific. ■

- 1 As part of the old Cold War NATO reinforcement of the Northern Flank, deployment.
- 2 Which as records from the Soviet Union would not have been possible but for the fact that Mrs Thatcher secured victory in the South Atlantic in 1982 and successfully engaged the significantly Soviet-infiltrated National Union of Miners between 1984-1985.
- 3 'For most of 1992-1995, Britain stood aside while an internationally recognised state was attacked by externally-sponsored rebels bent on a campaign of territorial aggression and ethnic cleansing. It was her unfinest hour since 1938', see Simms B. (2001) *Unfinest Hour: Britain and the Destruction of Bosnia* London: Penguin.



01 RAN SEEKS PHALANX UPGRADES

On 14 October 2014 the US Defense Security Co-operation Agency (DSCA) announced that the US State Department had approved a potential sale of Block 1B Baseline 2 upgrade kits and services for the Raytheon Phalanx Close-In Weapon System (CIWS) to Australia under the Foreign Military Sale (FMS) programme.

According to the DSCA announcement, Australia has requested conversion kits to upgrade up to three Block 1B Baseline 1 CIWS mounts to Baseline 2 standards, along with overhaul and upgrade services for up to nine Block 1A CIWS mounts to Block 1B Baseline 2 standards. The proposed US\$76 million deal also includes 11 remote control stations, 11 local control stations, spare and repair parts, as well as logistical and technical support services.

Australia is progressively upgrading its existing inventory of Phalanx CIWS Block 1A mounts under the Department of Defence's (DoD's) Project SEA 1357 Phase 1 programme, which aims to improve the shipboard defences of its major surface combatants against a variety of above-water threats. It expects a first pass approval in 2015 and an overall programme cost of AU\$100 million.

02 NEW TRAINING SYSTEM FOR ADF HELICOPTER CREWS

A new helicopter training system for Navy and Army personnel, Project AIR 9000 Phase 8, has been approved by the Government. The Helicopter Aircrew Training System (HATS) will be based at HMAS ALBATROSS in Nowra, NSW. The preferred partner for HATS, Boeing

Defence Australia, has proposed a training system that will include purpose designed syllabi based on 15 Airbus Helicopter EC-135 twin-engine 'glass cockpit' training helicopters; three full-motion Thales EC-135 Flight Simulators and the addition of a flight deck to Navy's new sea-going training vessel. Minister for defence, Senator David Johnston, said the joint service approach would benefit the ADF because of the reduced training burden on operational aircraft and enhanced Navy and Army operations from the new amphibious ships.

"Defence will also achieve a significant efficiency now that all Army and Navy aircrew will do their initial helicopter training in the one location.

"Being based at ALBATROSS will also bring the advantage of aircrew being able to train in realistic conditions at sea including ship deck-landing and search and rescue skills." The approval allocates over \$700 million to acquire the new training system which includes around \$200 million in new and refurbished facilities at ALBATROSS.

He said he expected that in excess of 380 short term and more than 80 long term jobs will be created because of the project in the Shoalhaven area.

Initial Operating Capability for HATS is late 2018 but the systems will begin to receive students before then, with a mature training capacity of up to 130 students a year covering pilots, aviation warfare officers, aircrewmen, sensor operators and qualified aircrew returning for instructor training.

ADF COMPLETES MONITORING OF RUSSIAN SURFACE TASK GROUP

Australian Defence Force vessels and aircraft monitored a Russian Surface Task Group that was operating in the Coral Sea to Australia's north during the recent G20 talks in Brisbane. The Russian ships did not enter Australian territorial waters and departed the Coral Sea after the talks.

The flotilla included Russian Federation Ship (RFS) VARYAG, a Slava class guided missile cruiser, RFS MARSHAL SHAPOSHNIKOV, a Udaloy class guided missile destroyer, and two support ships, BORIS BUTOMA and FOTIY KRYLOV.

The Chief of the Defence Force, Air Chief Marshal Binskin, said that the ADF monitoring activity was conducted professionally and was effective.

"We planned and conducted deliberate operations with Royal Australian Air Force AP-3C Orion aircraft and monitored the flotilla with HMA ships PARRAMATTA and STUART," ACM Binskin said.

"HMAS SIRIUS was positioned to provide logistic support and HMAS SYDNEY was in the south Queensland area to support G20 and assist with this activity if required.

"Russia declared its intention for vessels to travel to southern areas of the Pacific Ocean and their movement was consistent with the provisions under international law for military vessels to exercise freedom of navigation in international waters."

ACM Binskin said the activity was completed professionally by both the Australian and Russian personnel.

"We made periodic radio contact with the Russian flotilla and this communication was

01 A Mk-15 Block 1B Phalanx. (USN)





conducted professionally and courteously by all parties and was consistent with normal maritime communication procedures," ACM Binskin said.

As a matter of normal practice the ADF maintains an awareness of maritime activity in the approaches to Australia and regularly undertakes maritime surveillance patrols in these approaches. The ADF monitored the vessels in accordance with international law. This activity is consistent with the Russian Federation Navy's previous maritime movements ahead of major international events.

In 2009, Russian naval vessels were deployed to South East Asia for the APEC Conference in Singapore and in 2010 they were deployed to coincide with former Russian President Medvedev's visit to San Francisco.

SPAIN COMPLETES S 80 SUBMARINE RE-DESIGN WORK

Spanish shipbuilder Navantia believes it has resolved balance problems with the design of the Spanish Navy's new S-80 class submarines that halted the four-boat programme more than a year ago.

The comopnay is now awaiting approval from the Spanish Ministry of Defence (MoD) to commence building with the required design alterations.

The Spanish MoD has not made a major statement on the S-80 programme since July 2013, when it talked of revised delivery dates for the boats starting from 2017 due to the problems.

A team from US firm General Dynamics Electric Boat arrived in early 2013 to assist with the re-design work.

The first S-80 was originally due to have been handed over in 2012, but that date had already been pushed back to mid-2015 even before the balance problems were discovered.

03 RN COMMISSIONS FIRST FRONT-LINE WILDCAT SQUADRON

The Royal Navy's (RN's) first front-line Wildcat HMA.2 maritime helicopter squadron has been stood up ahead of the type's introduction to operational service in early 2015.

Formally commissioned at Royal Naval Air Station (RNAS) Yeovilton on 10 October 2014, 825 Naval Air Squadron (NAS) effectively merges what were 700W NAS (which had taken responsibility for Wildcat tactical development and initial training) and 702 NAS (which previously provided training for the Lynx force). The final retirement of the Lynx HMA.8 is due at the end of March 2017. Under current plans, a total of 16 front-line Wildcat flights will have stood up by July 2017, parented by the two frontline squadrons.

A total of 28 Wildcat HMA.2 helicopters (based on AgustaWestland's AW159 air vehicle) are on order for the RN to replace the legacy Lynx HMA.8 force. The Wildcat introduces a new airframe structure, a low set symmetric tailplane and fixed tail cone/pylon structure, and additional avionics enhancements.

The Wildcat features a number of role-specific equipment including the Seaspray 7400 multi-mode radar, an electronic support measures (ESM) function, a deck-lock, castoring nosewheel, flotation devices, and provision for anti-ship/anti-submarine weapons.

UK CONTRACTS FOR TOP-UP TOMAHAWK BUY

The UK Ministry of Defence (MoD) has confirmed an order for a further 20 UGM-109E Tomahawk Block IV land attack cruise missiles, but has declined to reveal whether it plans to expand the UK's Tomahawk inventory. Royal Navy (RN) Trafalgar- and Astute-class nuclear-powered attack submarines (SSNs) are equipped to fire the encapsulated Torpedo Tube Launch (TTL) variant of Tomahawk Block IV, as well as the earlier Block IIIC missile. The latter is due to go out of service by 2020.

04 USN COMMISSIONS AVIATION-CENTRIC AMPHIBIOUS ASSAULT SHIP

On 11 October 2014 the US Navy (USN) commissioned a new amphibious assault ship, USS AMERICA.

The ship has been optimised to operate the F-35B Lightning II Joint Strike Fighter (JSF) and the MV-22 Osprey.

AMERICA is the lead ship in a new class intended to replace the USN's Tarawa-class amphibious assault ships. Four of the five Tarawa vessels have been decommissioned, with fifth-in-class USS PELELIU (LHA-5) scheduled for decommissioning in 2015.

AMERICA is the first of two amphibious assault ships in the new class designed without a well deck capability. The ship has an extended hangar bay, bespoke maintenance spaces belowdecks to service next-generation aviation assets, and extra storage for JP-5 fuel and for ordnance. The extra space allows the America-class ships to accommodate the USMC's full air combat element, which

02 A diagram of the new EC-135 HATS aircraft from Airbus Helicopters. (Airbus Helicopters)

03 A new Wildcat maritime helicopter of the RN. The RN's first front-line Wildcat HMA.2 maritime helicopter squadron has been stood up ahead of the type's introduction to operational service in early 2015. (RN)



traditionally has been dispersed among the trio of warships that form an amphibious ready group.

AMERICA will be based with the Pacific Fleet in San Diego, California.

The 257.3 m long ship design is based on that of the navy's Wasp-class amphibious assault ship USS MAKIN ISLAND (LHD-8), which was the USN's first surface ship fitted with gas turbines and an auxiliary propulsion system (APS). Instead of using main propulsion engines to power the ship's shaft, the APS employs two induction-type auxiliary propulsion motors that are powered from the ship's electrical grid.

MBDA BEGINS CRUISE MISSILE PRODUCTION

European missile company MBDA has announced it has commenced low-rate initial production (LRIP) of a new cruise missile for the French Navy. The new Missile de Croisière Naval (MdcN) cruise missile is expected to be delivered early in 2015. Manufacture rates will ramp up in the coming months, with full series production to be achieved during 2015. The MdcN, given the product name Naval Cruise Missile (NCM) by MBDA, was developed under a full-scale development contract awarded by the Direction Générale de l'Armement (DGA) in December 2006. It has been developed to provide the French Navy with a sovereign deep strike capability against fixed high-value targets.

MdcN will equip the French Navy's Aquitaine-class FREMM multi-mission frigates from 2015, and the new Barracuda nuclear-powered attack submarines from 2018.

MBDA previously identified the MdcN as

SCALP Naval, reflecting the programme's antecedents in the Système de Croisière Autonome à Longue Portée - Emploi Général (SCALP-EG)/Storm Shadow air-launched conventional stand-off missile. However, the SCALP Naval name has now been formally dropped by the company.

Adopting the same guidance system as SCALP-EG/Storm Shadow - combining inertial guidance, terrain matching, and GPS with an imaging infrared (IR) seeker, so as to achieve metric accuracies in the terminal phase - the MdcN also capitalises on the existing SCALP-EG/Storm Shadow targeting and mission-planning infrastructure. However, the air vehicle itself is totally new (to allow for discharge from standard 533 mm torpedo tubes) and features a new cylindrical airframe with three flip-out rear fins, and pop-out wings mounted within the fuselage.

The dimensional constraints of the airframe also required changes to the propulsion system, with the smaller Microturbo TR50 turbojet introduced in place of the TR60-30 unit fitted to SCALP-EG/Storm Shadow. While MBDA will not discuss specific range performance, the DGA acknowledges the ability of the MdcN to strike at targets "several hundred kilometres" away.

A first all-up-round firing test of the MdcN was performed from the DGA test centre at Biscarrosse in May 2010. This was carried out from a SYLVER A70 vertical launcher (as fitted in the Aquitaine class).

MARINE NATIONALE RECEIVES FIRST UPGRADED RAFALE F3

The French Navy (Marine Nationale) has received the first of its Dassault Rafale M carrier-borne fighter aircraft modernised from the F1 to the F3 standard.

Dassault is currently in the process of upgrading 10 of the French Navy's Rafale M aircraft from the F1 to the F3 standard, with deliveries expected to be completed in 2017. The modernisation of the F1 Rafales, previously withdrawn from frontline service, was begun in April 2012 in order to replace the French Navy's remaining Dassault Super Etendard carrier fighter aircraft when they are retired in 2016.

The modernisation process from F1 to F3 standard includes the installation of a new cockpit suite, changes to the aircraft's pylons and storage capabilities, adjustments to the front of the aircraft to allow the installation of the new RBE2 AESA radar (although this is not fitted as standard), the addition of the Thales SPECTRA (Système de Protection et d'Évitement des Conduites de Tir du Rafale) electronic warfare/countermeasure suite, installation of new mission computers, and a complete rewiring of the aircraft's internal cabling. As a result, the F1 upgrade process required the complete disassembly of the aircraft unlike the upgrade from F2 to F3.

Dassault has delivered a total of 133 Rafales, across the B, C, and M variants, to the French Navy and Air Force.

04 The USN's LHA USS AMERICA arriving in San Diego.





05 NEW TNI CORVETTES GET PANTHER ASW HELICOPTERS

The Indonesian Navy (TNI-AL) has decided to equip its three recently acquired Bung Tomo-class corvettes (ex- Royal Brunei Navy Nakhoda Ragam class corvettes) with the AS565 Panther anti-submarine warfare (ASW) helicopter from Airbus Helicopters.

KRI BUNG TOMO the lead ship in class, conducted first of class flight trials with an AS365N Dauphin 2, similar to the AS565 Panther, on 29 September 2014. The trials were held in the seas of central Java ahead of the vessel's appearance at the Indonesian Armed Forces Day celebration on 7 October.

The TNI-AL announced in May 2014 that it was acquiring 16 AS565 Panther helicopters that will be configured for ASW. Some of the platforms will be deployed on the service's Sigma 10514-class guided-missile corvettes.

06 RCN RETIRES FOUR SHIPS EARLY

On 19 September the Royal Canadian Navy (RCN) announced that four of its warships are being retired early in an effort to preserve resources for modernising and renewing the naval force structure as a whole.

Vice Admiral Mark Norman, commander of the RCN, told reporters that the four ships - two of the RCN's three Iroquois-class guided-missile destroyers and the fleet's two auxiliary oil replenishment (AOR) ships - are "out of service immediately" and that "none of them would go to sea again".

HMCS IROQUOIS (DDG 280) and HMCS ALGONQUIN (DDG 283) - the lead and fourth ships, respectively, of the Iroquois destroyer

class - and HMCS PROTECTEUR (AOR 509) and HMCS PRESERVER (AOR 510) - the RCN's two Protecteur-class auxiliary ships - are being withdrawn ahead of the scheduled end of their service lives.

VADM Norman said that the vessels' early retirement was the most responsible approach and would allow for resources to be allocated to support the continuing modernisation programme of the fleet's 12 Halifax-class frigates as well as to help fund future replacement ships under the CA\$36.6 billion (USD32.9 billion) fleet renewal project, known as the National Shipbuilding Procurement Strategy (NSPS).

USN HELICOPTER-BORNE ACTIVE DECOY ANTI-SHIP MISSILE DEFENCE

The USN is developing a new anti-ship missile defence electronic attack (EA) payload to be deployed from its MH-60 helicopters but operated under the control of the shipborne AN/SLQ-32 electronic warfare (EW) suite.

The programme, known as the Advanced Offboard Electronic Warfare (AOEW) Active Mission Payload (AMP), is intended to deliver a new long-endurance offboard countermeasures capability for use in next-generation co-ordinated EW missions against current and future anti-ship missile threats.

AOEW was established in fiscal year 2012 to develop a new generation of radio frequency (RF) soft-kill devices to protect USN battle groups. A first increment - known as the Rapid Response effort - is being met by the off-the-shelf procurement of Airborne Systems' Outfit DLF(3b) inflatable RF decoy, known as Mk 59 Mod 0 in USN service.

The AOEW AMP concept of operations envisages the shipborne SLQ-32 detecting incoming anti-ship missile threats, then cueing and controlling the helicopter-borne AMP (via a Link 16 communications link) using its soft kill co-ordinator (SKC) function. AMP EA effects will be co-ordinated by SLQ-32/SKC in conjunction with other soft-kill RF countermeasures during the engagement.

07 JSF TRAPS ABOARD

The F-35C Lightning II carrier variant Joint Strike Fighter completed its first phase of developmental test (DT) aboard the aircraft carrier USS NIMITZ (CVN-68).

During the DT-I event, F-35C Lightning II Joint Strike Fighter (JSF) the F-35 Lightning II Integrated Test Force (ITF) from Air Test and Evaluation Squadron 23 (VX-23) located at Naval Air Station (NAS) Patuxent River in Patuxent River, Maryland, tested the carrier suitability of the aircraft and its integration with carrier air and deck operations in the at-sea environment, achieving 100 percent of the threshold test points.

The aircraft demonstrated exceptional performance throughout its initial sea trails, accelerating the team's progress through the DT-I schedule and enabling them to conduct night operations - a milestone typically achieved during the second at-sea phase of developmental tests, as evidenced by the test schedules of the F/A-18 Hornet and F/A-18 E/F Super Hornet.

"We had such confidence in how the plane is flying that we lowered the weather minimums to what the fleet is actually using, knowing that when I lower my hook and come into

05 The Indonesian Navy's three recently acquired Bung Tomo-class corvettes (ex- Royal Brunei Navy Nakhoda Ragam class corvettes).

06 HMCS IROQUOIS leads HMCS PRESERVER and HMCS Charlottetown. IROQUOIS, ALGONQUIN, PROTECTEUR and PRESERVER have been decommissioned. (RCN)



the groove I'm going to trap," said Lt. Cmdr. Ted Dyckman, Navy test pilot. "That says a lot for the airplane. So, when it came time for night traps, we said the plane is ready and we launched it. It flew very well behind the ship. Even on the darkest night - pretty much as dark as you can get behind the boat. Two hook-down passes and two traps and that says it all right there. It's unheard of to conduct night ops on the first det."

"The engineers responsible for the aircraft's control laws at Pax (Patuxent) River and Fort Worth have done a phenomenal job designing a carefree aircraft from the pilot's perspective," said Cmdr. Tony Wilson, DT I Team Lead. "The F-35C's performance on the ball was revolutionary, providing carefree handling on approach. The Integrated Direct Lift Control (IDLC) allows ball control like no other aircraft. The control schemes of the F-35C provide a tool for the below average ball flyer to compete for top hook. And, Delta Flight Path is an innovative leap in aircraft flight controls - this command enables the F-35 to capture and maintain a glideslope, greatly reducing pilot workload, increasing safety margins during carrier approaches and reducing touchdown dispersion."

The cadre of DT-I test pilots logged a total of 39.2 flight hours as they conducted 33 flights featuring 124 catapults, 222 touch-and-go landings, and 124 arrestments. There were zero unintentional hook-down bolters, or missed attempts to catch an arresting wire on the flight deck. (Two hook-down, intentional bolters were conducted as part of the DT-I test plan.)

Successful carrier landings of the F-35C also point to an effective re-design of the once-

troubled tailhook. Initial testing shore-based testing pointed toward tailhook design issues and the Atlantic Test Range (ATR) at NAS Patuxent River captured critical measurement data with their precision photogrammetric technology and modeling capabilities. The re-design collaboration between Lockheed Martin and Fokker Technologies of the Netherlands - with insight and participation by Navy airworthiness engineers - has yielded a preponderance of three-wire landings during DT-I and firmly established the success of the redesign.

The goal of DT-I, the first of three at-sea test phases planned for the F-35C, was to collect environmental data through added instrumentation to measure the F-35C's integration to flight deck operations and to further define the F-35C's operating parameters aboard the aircraft carrier. A thorough assessment of how well the F-35C operated in the shipboard environment will advise the USN of any adjustments necessary to ensure that the fifth-generation fighter is fully capable and ready to deploy to the fleet in 2018.

USN HARVESTS DECOMMISSIONED FFG'S SYSTEMS

Engineers at the US Naval Ship Systems Engineering Station (NAVSESES), Naval Surface Warfare Center Carderock Division are harvesting weapon system components from decommissioned U.S. Navy frigates (FFGs) for re-use on US Coast Guard cutters. The harvesting of components from four decommissioned frigates will result in more than US\$24 million in cost avoidance, with more expected from a fifth ship. The USN's

leveraging of decommissioned ships' assets shows a judicious use of resources and collaboration between services.

"The Navy's FFGs will all be decommissioned by the end of fiscal year 2015, but the Coast Guard cutters have the same gun weapons systems," said Abe Boughner, with Auxiliary Ships/Acquisition Support Branch at NAVSSES.

The equipment includes MK 75, 76mm/62 calibre gun mounts, as well as gun control panels, barrels, launchers, junction boxes and other components. The Coast Guard can use all of this equipment on cutters during the course of the ships' expected service life, which spans into the 2030s.

AEGIS DESTROYER SCORES HISTORIC FLIGHT TEST MISSION

Sailors aboard the USS JOHN PAUL JONES (DDG-53) in partnership with U.S. Pacific Command and the Missile Defense Agency (MDA) successfully executed Flight Test Standard Missile-25 (FTM-25), the first live-fire event in the integrated air and missile defence radar priority mode to engage a ballistic missile target and a raid of cruise missile targets with its AEGIS Combat System, announced Programme Executive Office Integrated Warfare Systems (PEO IWS), Nov. 20.

DDG-53 engaged three successful near-simultaneous target shots over the Pacific Ocean by the Aegis Baseline 9.C1 (BMD 5.0 Capability Upgrade) Weapon System. One short-range ballistic missile target was intercepted by a Standard Missile-3 Block 1B guided missile, while two low-flying cruise missile targets were engaged by Standard

07

An F-35C Lightning II carrier variant Joint Strike Fighter trapping aboard USS NIMITZ (CVN-68) during recent initial testing at sea. (USN)





Missile-2 Block IIIA guided missiles.

"The capability that the USS JOHN PAUL JONES demonstrated during FTM-25 is the culmination of years of tough engineering across the USN's technical community and our industry partners," said Rear Adm. Jon A. Hill, PEO IWS. "The technology displayed during FTM-25 will be a critical addition to the fleet and their ability to stay prepared."

PEO IWS spearheaded the FTM-25 as part of a developmental test/operational test sequence of events. Other test participants included discriminating sensors flown on two MQ-9 Reaper unmanned aerial vehicles and sensor systems ashore, Command and Control, Battle Management and Communications (C2BMC) Enterprise Sensors Lab, C2BMC Experimentation Lab, and the AEGIS Ashore Missile Defense Test Complex located at the Pacific Missile Range Facility.

08 MQ-8C FIRE SCOUT PREPARES FOR SHIPBOARD TESTING

US Company Northrop Grumman successfully completed precision sloped landing tests on 27 August 2014 with the MQ-8C Fire Scout at Naval Base Ventura County, Point Mugu, in preparation for at-sea testing.

MQ-8C Fire Scout has been undergoing rigorous flight testing and validation, which will culminate in the actual takeoff and landing on the deck of a Navy vessel at-sea. The MQ-8C is the company's latest variant of its successful Fire Scout unmanned aerial system, which performs intelligence, surveillance and reconnaissance missions for the U.S. Navy.

"The sloped takeoff and landing tests are

designed to be as real as it gets to actually operating on a Navy ship," said Capt. Patrick Smith, Fire Scout program manager at Naval Air Systems Command. "The autonomous MQ-8C Fire Scout system is able to precisely track and understand the roll and pitch of the surface which resembles at-sea conditions."

The sloped landing platform was previously used to test and certify the MQ-8B Fire Scout for ship-based operations and is now being used for the more capable MQ-8C. The MQ-8C is utilizing the same proven autonomous system for takeoff and landings as the current MQ-8B model.

"The MQ-8C Fire Scout system is performing as predicted and as previously demonstrated during Fire-X testing back in 2011," said George Vardoulakis, vice president for Medium Range Tactical Systems, Northrop Grumman. "These tests enable a validation of our autonomous system and clear the way for dynamic interface testing onboard the ship." Since its first flight Oct. 31, 2013, the MQ-8C Fire Scout has flown 219 flights and 287 hours. The most recent tests on the MQ-8C have consisted of electromagnetic testing, which assured compatibility with ship-based emitters (like radar) and an initial phase of dynamic interface testing, which looked at deck handling and communications networks. The MQ-8C's first ship-based series of flights are planned for later this year.

09 VMX-22 RECEIVES FIRST F-35B

Marine Operational and Evaluation Squadron 22 received its first F-35B aircraft at Edwards Air Force Base, California for operational testing on October 9, 2014.

"VMX-22's mission is to conduct operational testing and evaluation of U.S. Marine Corps' fixed, tiltrotor, and rotary-wing aircraft, Unmanned Aerial Systems, and Marine Air Command and Control Systems, support concept development, and assist in the creation of Marine aviation tactics, techniques and procedures through experimentation and support to tactical demonstrations," said Col. Robert L. Rauenhurst, commanding officer of Marine Operational and Evaluation Squadron 22.

Previously, VMX-22 only consisted of MV-22 and CH-53 aircraft, but the arrival of the F-35B marks the start of VMX-22 fixed wing flight operations. This is the first of four F-35B aircraft that will arrive over the upcoming months at Edwards Air Force Base.

"The addition of the F-35B at VMX-22 will help to develop increased capabilities and interoperability of the Aviation Combat Elements to support the Marine Air/Ground Task Force of the 21st century," Rauenhurst said.

The operational testing will determine how effective and suitable the F-35B aircraft will be in its intended operational environment. The successful completion of the operational testing is required in order for the aircraft to proceed from low-rate initial production into full rate production.

Operational testing will be held at Edwards Air Force Base, Naval Air Warfare Center Weapons Division China Lake, California; Nellis Air Force Base, Nevada; Marine Corps Air Ground Combat Center Twentynine Palms, California; Marine Corps Air Station Yuma, Arizona; and aboard the USS WASP.

The F-35B operational test is slated to be

08 An MQ-8C Fire Scout during precision sloped landing tests. (Northrop Grumman)

09 The first production F-35B aircraft arriving at VMX-22 for operational testing. (USMC)



complete by 2018 at Edwards Air Force Base and will be continued throughout the life of the F-35 program as major block upgrades are completed.

10 RAN STUDIES CEAFA2

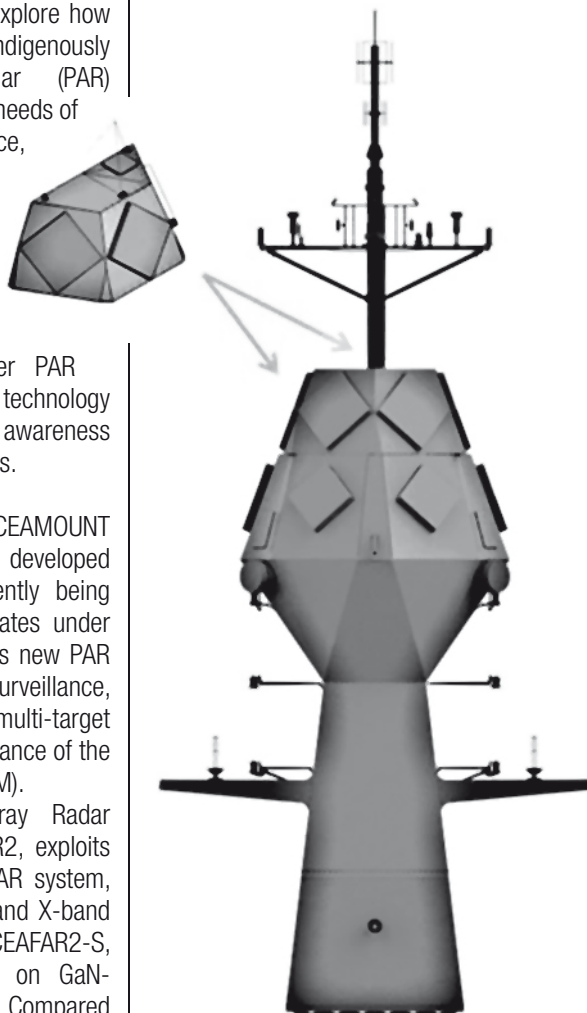
The Department of Defence (DoD) is funding CEA Technologies to explore how further development of its indigenously developed phased-array radar (PAR) technology could meet the future needs of the RAN's surface combatant force, such as the Anzac and SEA 5000 frigates.

This work, being advanced under the High Power Phased Array Radar concept demonstrator programme, is exploring how a high-power PAR exploiting gallium nitride (GaN) technology could contribute to the situational awareness and survivability of the RAN's ships.

The CEAFA S-band radar and CEAMOUNT X-band multi-channel illuminator developed by CEA Technologies are currently being refitted to the eight ANZAC frigates under Project SEA 1448 Phase 2B. This new PAR suite provides a capability for surveillance, target indication and tracking, multi-target illumination, and multi-target guidance of the Evolved SeaSparrow Missile (ESSM).

The High Power Phased Array Radar demonstrator, known as CEAFA2, exploits existing investment in the CEAFA system, but funds maturation of L-, S-, and X-band technology - CEAFA2-L, CEAFA2-S, and CEAMOUNT2-X - drawing on GaN-based transmit/receive modules. Compared

with previous-generation gallium arsenide devices, GaN transmit/receive modules provide improved power, efficiency, and bandwidth performance. ■



10

A computer generated image of the potential new CEAFA2-L radar mast arrangement for an ANZAC class frigate. (CEA)



AUSTRALIAN NAVY FOUNDATION DAY CRESWELL ORATION 2015

MONDAY 2ND MARCH 2015

CRESWELL ORATION 2015

Fleet Commander Rear Admiral Stuart Mayer will present the Australian Navy Foundation Day Creswell Oration 2015

VENUE

Wm Angliss TAFE restaurant
550 Little Lonsdale Street, Melbourne

DATE

Monday 2nd March 2015

TIME

1200 for 1230 lunch

BOOKINGS

Navy League of Australia
VIC-TAS Division
P.O. Box 2340

Mount Waverley, Victoria 3149

OR names and numbers attending

EMAIL - raydotgill@optusnet.com.au

COST \$40 per head

PAYMENT

By Cheque or by direct Deposit
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DEFENDING OUR NEIGHBOURHOOD: CAN WE GUARD AUSTRALIA'S MARITIME FRONTIER?

By George Galdorisi

George Galdorisi's 2014 Navy League Essay Competition first place entry asks the question how can the ADF secure our wider strategic interests in our very large maritime region.

A STRATEGIC CROSSROADS

"Australia's defence policy continues to be based on the principle of self-reliance in the direct defence of Australia, and in relation to our unique strategic interests in our neighbourhood."

Australian Defence Force Posture Review - 30 March 2012

The nexus of world power is shifting to the Asia-Pacific region and Indo-Pacific Ocean, Robert Kaplan explains in his best-selling book, *Monsoon*. "The Greater Indian Ocean," he writes, "stretching eastward from the Horn of Africa past the Arabian Peninsula, the Iranian plateau, and the Indian Subcontinent, all the way to the Indonesian archipelago and beyond, may comprise a map as iconic to the new century as Europe was to the last one." Its shores washed by both oceans, Australia in 2014 is poised to be a critical player—some would say the critical player—in ensuring the security and prosperity of the entire Indo-Asia region.

Australia's 2012 *Defence Force Posture Review* emphasizes the need to balance the nation's strategic interests with its available defence resources especially in the neighbourhood surrounding the Australian continent. Further, as Australia's 2013 *Defence White Paper* explains, "A new Indo-Pacific strategic arc is beginning to emerge. Australia's enduring interest in the stability of what it called the wider Asia-Pacific region. The Indo-Pacific is a logical extension of this concept, and adjusts Australia's strategic focus to the arc extending from India through Southeast Asia to Northeast Asia, including the sea lines of communication on which the region depends. The emerging Indo-Pacific system is predominantly a maritime environment with Southeast Asia at its geographic centre."

As Australians know, the oceans—not the land—define the region, and those oceans and the global commons are more important to Australia's security and prosperity than ever before. This has been embedded at the highest levels of Australian national and defence policy. But for the oceans



Officers from the USN inspect the wreckage of the South Korean corvette CHEONAN which was sunk by a North Korean missile launched torpedo. The ship was recovered and is now on permanent display as a memorial to the lost sailors from the ship. (USN)

surrounding Australia to continue to deliver that security and prosperity, Australia must have the wherewithal to effectively monitor and patrol this oceanic area. At the moment, that ability is in question.

A NEW DEFENCE STRATEGY

"One of the fundamental responsibilities of any Australian Government is to protect and defend our people and protect and enhance our national security interests."

Australia's 2013 Defence White Paper

As the 2013 *Defence White Paper* states, Australia lives in a dangerous neighbourhood. Not only neighbour states, some with, at best, uncertain objectives, but non-state actors with malign intentions such as terrorists, drug traffickers, human smugglers, pirates, transnational criminals and a variety of other threats all make for a potent range of dangers. What is common to all these threats is they will reach Australia via the oceans that surround this expansive continent. The Australian Defence Force (the ADF) recognizes these new threat vectors and has, and will, continue to invest in maritime capabilities.

While they refer to the previous Defence White Paper, Jack McCaffrie and Chris Rahman have it right. As they pointed out in their article, "Australia's 2009 Defence White Paper: A Maritime Focus for Uncertain Times," in the *U.S. Naval War College Review*, during the past decade Australia has shifted from fielding a defence force with a continental focus to building one that is predominantly maritime.

McCaffrie and Rahman contend that notwithstanding the broad geographical reach of its outlook, the white paper *geographically bounds Australia's main strategic interests*: the defence of Australia and security in the immediate neighbourhood, that is, Indonesia, East Timor, Papua New Guinea, New Zealand, and the South Pacific. This is based on the premise that Australia's capacity to influence events is greatest closer to home.

But this is easier said than done. As Australia assesses its ability to monitor and patrol the oceanic area in the immediate neighbourhood surrounding the Australian continent, it must do so in an increasingly constrained budgetary environment. This will make it imperative for the ADF to be a smart shopper and procure the most cost-effective platforms, systems, sensors and weapons it needs to do the job.

DOING MORE WITH LESS

The Global Financial Crisis and ongoing volatility in the global economy have created new fiscal challenges for Australia. The world economy, on which both our security and prosperity depend, remains the biggest strategic uncertainty.

Australia's 2013 Defence White Paper

As the *2013 Defence White Paper* makes clear, in Australia, the historical annual average defence spending since the end of the Vietnam War is approximately 2.2 per cent of Australia's Gross Domestic Product (GDP). But since 2000, the annual average has been around 1.8 per cent of GDP with the Defence Budget remaining below 2 per cent of GDP across this period.

It is easy to suggest that Australia just "get on with it" and increase spending for the ADF to higher levels in order to secure the nation's security and prosperity. But as the *2013 Defence White Paper* notes, the

Defence Budget is a significant component of Government expenditures and national security objectives need to be considered in light of this constrained fiscal environment. The then government cut Australia's defence spending as a share of GDP to its smallest level since 1938, at a time when the trend among major Asian powers is to *increase* defence spending. Australia's most recent defence budget was about 1.5 per cent of GDP, down from 1.8 per cent a year ago. And this is occurring as the total defence spending in Asia this year is projected to overtake that of Europe for the first time since the industrial revolution.

It is fair to say that the ADF is still coming to grips with these new budget realities and tough decisions will need to be made in the near and far term. And while how this will all shake out is, for the moment, opaque, what is certain is the ADF will need to make choices and separate the need-to-have platforms, weapons, systems, and sensors from those that are-nice-to-have. And as we noted above, these tradeoffs will need to be made in the context of what McCaffrie and Rahman so aptly called "Australia's main strategic interests: the defence of Australia and security in the immediate neighbourhood."

THE WICKED HARD CHALLENGE OF POLICING THE MARITIME COMMONS

"All the business of war, and indeed all the business of life, is to endeavour to find out what you don't know by what you do; that's what I call guessing what's on the other side of the hill."

The Duke of Wellington

The Correspondence and Diaries of John Wilson Croker

Few military heroes are more well-known to the inhabitants of English-speaking nations than the Duke of Wellington. And while Wellington's epic victory at Waterloo occurred almost two centuries ago in 1815, what he knew tactically as a land commander is true today in the maritime domain. The first order of business is to know, in this case, what is beyond the visual horizon in the maritime arena, in other words, to have at least situational maritime domain awareness (MDA) over an area of strategic, operational, or tactical interest.



HMAS PARRAMATTA (foreground) in the Coral Sea monitoring the Russian Federation Ships VARYAG (left) and the auxiliary oil replenishment ship BORIS BUTOMA during the recent G20 meeting in Brisbane. The task was a good test of the ADF's ability to monitor naval operations being conducted in our primary area of strategic interest (see *Flash Traffic* this edition for more details). (Defence)

Mention geography, and for many, their eyes glaze over as they remember primary school lessons recalling endless names of countries and capitals. But for Australia and for other nations in the region, the influence of geography on their strategic situation is so profound, it is worth taking a moment to step back and assess the geographic realities. It is no surprise Robert Kaplan's book, *The Revenge of Geography*, was an instant best-seller. And his mantra, those who forget geography can never defeat it, has a profound impact of how Australia and its neighbour nations must think strategically.

While current platforms, systems and sensors fielded by the ADF are able to provide situational MDA in some areas for some of the time, the ability to maintain continuous coverage of any reasonable oceanic expanse around Australia today is nascent at best. The areas are just too vast and the threats too diverse for the ADF to have a fair chance to meet the challenge of reasonable situational MDA today.

And given the types of threats the ADF will need to deal with in its immediate neighbourhood—the array of threats to the territorial integrity of the continent mentioned earlier; security of Australia's vast Exclusive Economic Zone; other maritime territorial disputes with neighbouring nations and a host of other potential threats—air assets are a primary, and often the *only* effective way, of “guessing what is on the other side of the hill,” in the oceanic expanse surrounding Australia. But just how big is the challenge?

Australia has one of the largest areas of maritime jurisdiction in the world and managing this area is a major national challenge. Further, the maritime environment around Australia is becoming more complex and contentious. Over the past decade, there have been increasing disagreements between Indo-Pacific nations on maritime issues, such as the disputes between China and Southeast Asian nations in the South China Sea; the disputes between China and Japan over the Senkaku Islands in the East China Sea; North Korea's sinking of the South Korean warship CHEONAN; and the differences of view among Asian nations over freedom of navigation.

The ADF has an enormous challenge to adapt to this new maritime focus given Australia's vast equities in the Pacific and Indian Oceans and surrounding seas. The first order assignment, and one that is crucial, is maintaining situational MDA of the millions of square kilometres these oceanic areas comprise. By way of comparison, focusing on the 200 nautical mile exclusive economic zone (EEZ) alone, Australia has the

largest area of maritime jurisdiction in the Asia-Pacific region, with an EEZ of 8.51 million square kilometres (mil.sq.km) followed by Indonesia (6.16 mil.sq.km), India (2.30 mil.sq.km), the Philippines (1.89 mil.sq.km) and China (1.36 mil.sq.km). The ADF would be challenged as it is to selectively maintain MDA in these areas, but given Australia's recent austerity moves, this task is becoming increasingly demanding.

POLICING THE MARITIME COMMONS ON A BUDGET

“Tools, or weapons, if only the right ones can be discovered, form 99 percent of victory. Strategy, command, leadership, courage, discipline, supply, organization and all the moral and physical paraphernalia of war are nothing to a high superiority of weapons – at most they go to form the one percent which makes the whole possible.”

*Max Boot quoting British General J.F.C. Fuller (1919)
War Made New*

As the 2013 Defence White Paper states, there is no higher priority for a Government than the protection of Australia's sovereignty, people and national security interests. The ADF has made a commitment—even with its constrained budget—to procure capable assets that are well-suited to provide maritime domain awareness in Australia's immediate neighbourhood. But as with most militaries, it is not just a question of *capability*—but also of *capacity*, that is, does the totality of assets in the plan provide a reasonable kit to do the job?

To review the bidding, Australia has committed to acquire eight P-8A Poseidon aircraft to *partially* replace its fleet of aging P-3 Orion aircraft. But partially is the operative word here, because the Project AIR 7000 Plan has called for a multi-mission unmanned aircraft system to complement the manned Poseidon in much the same way that the U.S. Navy intends to operate these platforms. For the ADF, the maritime surveillance package of the future teams the Poseidon with the MQ-4C Triton unmanned aircraft system (UAS).

The Triton UAS is optimized for the maritime domain. In a broadcast in September 2012, Radio Australia quoted intelligence analyst Matthew Aid who clarified the difference between the Global Hawk and the Triton. Aid noted, “Global Hawk was designed for pin-point imagery or eavesdropping on land targets, by overflight, or by flying obliquely off an enemy's coastline. Triton was designed for broad area maritime surveillance tasks such as following ships from high altitude.”

By embracing a large, major, unmanned system, Australia is at the leading edge of a trend that is gaining increased traction with militaries throughout the Asia-Pacific region. In an article entitled, “In Asia, C4ISR Market is Growing,” *Defense News* noted:

Maritime territorial disputes and security problems have caused the Asian market for intelligence, surveillance and reconnaissance (ISR) to continue expanding. China's aggressive behaviour in the East China and South China seas over the past two years has rattled the region. And continued concerns over piracy and other security issues in the Malacca Strait and Singapore Strait feed Singapore's quest for “sense-making” by the military... Nations in the region are looking at procuring maritime patrol aircraft, UAVs, and beacon location systems for ships... The military needs ISR aircraft and UAVs



Australia is currently acquiring eight new P-8 Poseidon maritime patrol aircraft but eight will not be enough. (Boeing)

to patrol offshore islands and sea lines of communication and monitor fishing areas.

This survey of the maritime C4ISR needs of Asia, collectively, also provides a fair representation of Australia's defence needs as it continues to refine its regional security responsibilities. But clearly, "guessing what is on the other side of the hill," will be a bedrock responsibility for the ADF. And simply put, given the *2013 Defence White Paper's* special emphasis on intelligence, surveillance and reconnaissance, a fleet of eight P-8A Poseidon aircraft and some discrete number of Tritons will not be sufficient to begin to carry out this mandate.

As Australia seeks more innovative and cost-effective solutions to patrol its vast oceanic domain, the national leadership and the ADF would be well-served to begin now to conduct the cost/benefit tradeoffs on what kinds of platforms, systems, sensors and weapons to procure to provide better situational MDA. This analysis must include, in particular, geography, people, technology and training. An odd mix of factors? Not at all.

The circumference of the Australian continent as measured along its vast coastline is over 36,000 kilometres. This length, much of it comprising largely-uninhabited areas, gives defence planners pause when considering how to overcome the tyranny of distance and provide situational MDA as a first step in intercepting an array of threats as well as securing Australia's equities in its neighbouring seas.

Likewise, the cost of military manpower continues to increase. As the *2013 Defence White Paper* makes clear, the Government's investment in people as a significant component of the Defence budget reflects the continued requirement for a professional workforce. Manning the ADF will be challenging. Demographic changes, skills shortfalls and demands from the minerals and petroleum resources sector are already impacting Defence's ability to achieve the workforce it requires. Add to these challenges the rapid advance of technology, the increasing cost of high-end military platforms, systems, sensors and weapons, the concomitant costs of training for expertise and proficiency and this presents a "perfect storm" that makes the challenge of maintaining situational MDA increasingly difficult.

For this observer, these factors mitigate against a number of otherwise sensible solutions to achieve situational MDA. For example, manned aircraft must be based somewhere near the areas they need to patrol, otherwise, they will spend too much time in transit. But options to

construct additional airfields on or near the Australian coast are limited. And pilots and crewmembers are increasingly expensive to recruit, train and retain, too often taking their expensive skills into a competitive labour market. And given their slower speeds and higher crew count, trying to use ships to provide this situational MDA would not appear to be much of a solution either.

So what *will* work? The ADF has taken a small but important step forward with its commitment to the Triton UAS. But more must be done. The use of UAS (or UAV, or drones, as they are frequently called) has exploded worldwide as they are often preferred for missions that are too "dull, dirty or dangerous" for manned aircraft. Most nations manufacturing large UAVs offer them for export. The ADF would be well-served to begin an analysis of alternatives with the objective of making a substantial future investment in these highly capable platforms to provide situational MDA.

And while it is not an "either-or" proposition of manned vs. unmanned, a comparison of the operational capabilities of the P-8 Poseidon and the MQ-4C Triton can help in understanding what unmanned platforms bring to the ADF in its efforts to provide situational MDA. If a Poseidon transits 500 km to station, it will have an on-station time of seven-and-one-half hours. Conversely, a Triton transiting the same distance to station will have an on-station time of twenty-two hours.

But beyond the raw numbers there are other reasons that favour an unmanned solution to achieving situational MDA: from the better radar coverage afforded by the radars on UAS; to the ability of the UAS to fly in weather that would ground its manned counterparts; to crew rest considerations for multiple manned aircraft sorties; to a host of others. Additionally, UAS technology is advancing much more rapidly than manned aircraft technology. Thus, the ADF will have access to successive generations of UAS technology much sooner than it would new manned aircraft or other platforms.

A WAY AHEAD

"When asked what single event was most helpful in developing the theory of relativity, Albert Einstein is reported to have answered, 'Figuring out how to think about the problem.'"

*Men, Women, Messages and Media:
Understanding Human Communication*



A USN MQ-4C Triton UAS. One of the best ways to monitor Australia's maritime area of interest is with more Triton's than currently being envisaged. (USN)

Australia is at a strategic nexus. It must make a decision whether it intends acquire the means to effectively monitor and patrol its vast oceanic domain, or leave this area as a highway for a wide range of threats to enter Australia and threaten the security and prosperity of this nation. The first and most critical step is to effectively provide situational MDA.

As Australia's national leadership and the ADF "think about this problem" they will likely discover there is simply no effective and affordable solution to provide adequate situational MDA other than unleashing the power of UAS. Australia's robust defence industry, the national defence procurement system, the military laboratory system and the ADF will need to work together to find the right mix of UAS to provide situational MDA around the Australian continent. Nothing less is at stake than the security and prosperity of the nation. ■



THE RENAISSANCE IN AIRCRAFT CARRIER CONSTRUCTION

By Kelvin Curnow

The revealing story of the re-emergence of the aircraft carrier (even in the form of the LHD) is told here by Kelvin Curnow in this his first place Navy League of Australia Essay entry for 2014 in the non-professional category.



Six USN LHDs (two Tarawa and four Wasp class) operating together for Gulf War II. The flexibility of the modern flat decked ship was demonstrated in this grouping with two of the LHDs operating AV-8B Harriers in place of helicopters and troops. (USN)

The air strikes by United States Navy (USN) F/A-18 Hornet fighter aircraft against Islamic State (IS) terrorists operating in Iraq once again highlighted the importance and flexibility of ship borne airpower. The strikes, beginning 8 August 2014, were launched from the USS GEORGE H. W. BUSH. The carrier transited from the North Arabian Sea to the Persian Gulf to facilitate the strikes, initially around the Kurdish city of Erbil. The ability to move quickly to counter a rapidly evolving and dangerous situation once again highlighted the importance of aircraft carriers in providing a swift and effective response. Carriers are in effect self-contained moveable airfields which can sail over 400+nm in a 24 hour period. They carry a range of aircraft which equate in type and kind to those of land-based air forces. In some instances, particularly in respect to the carrier air wings carried by the USN's nuclear-powered supercarriers, the number and capabilities of aircraft carried on a single ship far exceed those of many air forces. In these instances a nation operating just one carrier may be able to impose its political hegemony on another country with which it is in dispute, particularly one which is politically, economically and militarily weak. Moreover, the nations may not share a land border or even be separated by considerable distance but nevertheless be in dispute for a given reason. In this instance the aircraft carrier will be the dominating factor in determining the outcome of a conflict. (This was the case in respect to the Falklands conflict of 1982.) More nations

are now coming to the conclusion that carrier airpower is necessary to protect their own interests, secure sea lanes and if necessary impose their will in future conflicts. Having reached a nadir in the 1980s and 1990s, the construction and operation of aircraft carriers is now resurgent. Likewise, the capabilities of carrier aircraft are now at the same level and in some instances exceed those of their land based counterparts, the Boeing EA-18G Growler and Lockheed/Martin/BAE F-35C being the foremost examples.

HISTORICAL OVERVIEW

The surrender of Japan and culmination of World War II (WWII) witnessed the existence of two dominant naval powers, the United States of America and Great Britain. Throughout the conflict the navies of Japan, the USA and the UK operated significant numbers of aircraft carriers, a fact which marked them apart from all other Allied and Axis powers. The successful prosecution of the war in the Pacific was predicated on the necessity to hold air and sea dominance primarily through the deployment of aircraft operating from carriers. At the end of the war there were a significant number of unfinished hulls lying in British shipyards. These were not scrapped immediately and largely because of the nature of their design they were eminently adaptable for the operation of a new generation of post war naval aircraft, especially the first generation of naval jet fighters. The first indication that there was a change in attitude among the world's admiralities towards aircraft carriers, beyond those of the USA and UK, came during the Korean War. Not only were American and British aircraft carriers deployed to attack North Korean and Chinese targets, but an Australian carrier, HMAS SYDNEY,



China's 67,000tonne aircraft carrier LIAONING at sea with escorts. She is the largest non-USN aircraft carrier in the Pacific.



Spain's JUAN CARLOS I LHD (same as the RAN's Canberra class LHDs) with nine AV-8B Harrier II embarked. (Armada)

also took part in the action. She was originally laid down in Britain during WWII as a light fleet carrier. Post war she was completed and entered service with the Royal Australian Navy (RAN). This was to be the pattern of all subsequent sales of British carriers throughout the 1950s. Light fleet carriers were completed in UK shipyards and were sold to Canada, France, Brazil, India, the Netherlands and Argentina. All these ships were of either the *Colossus* or *Majestic* class and apart from the SYDNEY they were modified with the latest British innovations of the steam catapult, mirror landing sight and angled deck. Throughout the 1980s and 1990s these light fleet carriers were retired, their hulls being decidedly tired. The last to be decommissioned in 1991 was the Brazilian Navy's *Colossus* class, the NAe MINAS GERAIS.

AN EVOLUTION IN CARRIER DESIGN

The British withdrawal East of Suez in the late 1960s marked the beginning of end of operation by the RN of conventional catapult and arrestor gear equipped aircraft carriers. The last fleet carrier, HMS ARK ROYAL (IV) was finally retired in 1978. However, it was not to be the end of fixed wing operations by the RN. In 1979 a modified version of the RAF's Harrier ground attack aircraft was ordered into production. This was the BAe Sea Harrier, featuring a raised cockpit with a bubble canopy and a nose modified to carry the Blue Fox radar. This was anything but a fighter, but a minimal modification to an existent aircraft. It was designed for one primary purpose, to 'hack the shad', that is to shoot down Soviet bombers shadowing NATO naval forces in a time of conflict. The Sea Harriers were to be carried in small numbers and launched from small 'through deck cruisers' of the *Invincible* class. This new class of ships had one notable feature which marked them apart from all previous designs, the ski jump. The forward section of the flight deck was angled upwards which meant the aircraft's wings had greater lift as the Sea Harrier launched off the flight deck, thus permitting the fighter to operate at greater weights. Coupled with the nozzles on the Harrier's Pegasus engine which could be rotated to different degrees, this was revolutionary mode to launch fighters from navy ships. The

navies of Italy, Spain and India all adopted the ski jump on their aircraft carriers as a means to launch Harrier fighters. As a consequence of this innovation Western carrier designs fall into two categories, Catapult Assisted Take Off Barrier Assisted Recovery (CATOBAR) equipped ships and carriers which operate Short Take Off Vertical Landing (STOVL) aircraft. During the Cold War, the Soviet Union launched four vessels of the *Kiev* class. These were a hybrid cruiser/carrier vessel which operated ASW helicopters as well as the notably unsuccessful VSTOL fighter, the Yakovlev Yak-38 Forger B. Perceiving the inadequacies of both the design of the ships and the aircraft the Soviet Union sought to build much larger carriers with greater

capabilities. These were of a hybrid design featuring a steeply raked bow which acted as a ski jump, but they also were equipped with arrestor gear. The merits or otherwise of this Short Take Off Barrier Assisted Recovery (STOBAR) mode of operation are argued, but notably each country which operate vessels of this configuration plan to build CATOBAR vessels in the future. Currently there are three STOBAR vessels in operation worldwide, all ex-Soviet ships. These are Russia's KUZNETZOV, India's INS VIKRAMADITYA and China's LIAONING.

CURRENT CARRIER DESIGNS

The USN has maintained a consistent path since WWI of building both CATOBAR equipped carriers and Landing Helicopter Docks (LHDs) of increasingly large dimensions. In 1955 the USS FORRESTAL was commissioned into the USN. She marked a new type of ship colloquially known as 'supercarriers'. These are large carriers of over 80,000 tons equipped with four steam catapults and arrestor gear. Apart from the



Indian's new 45,000 tonne aircraft carrier VIKRAMADITYA. The ship uses the STOBAR concept for employment of its MiG-29 fighters.

A Russian Navy SU-27 Flanker taking off from its aircraft carrier KUZNETSOV. High thrust coupled with a good rolling distance and a ski jump mean there is no need for complex and expansive catapults to launch aircraft like the Flanker, or even the Hornet/Super Hornet.



nuclear powered USS ENTERPRISE these were all conventionally powered ships until the 1975 commissioning of the USS NIMITZ. The NIMITZ and all subsequent nine carriers of her class are nuclear powered. The three carriers of the *Ford* class ordered so far, the first of which USS GERALD R FORD was launched in November 2013, will also be nuclear powered. In addition to the USA only France has built a nuclear-powered CATOBAR equipped aircraft carrier, the FNS CHARLES DE GAULLE. Beyond Western Europe and America other countries are also making future plans with respect to naval aviation. China perceives the LIAONING to be a 'training carrier' and currently has plans to build two Type 001A carriers based on the LIAONING design. However, she is not the only nation with ambitions to build a significant carrier force and a survey of nations worldwide demonstrates a revival in both the building of aircraft carriers and naval aircraft. The following is an overview of ships in the construction or design phase, it excludes projects which have little or no prospect of construction and those already in service. Ships intended only for helicopter operations are also excluded.

AUSTRALIA

In 2007 Australia ordered two LHDs of the *Juan Carlos* design from Navantia shipbuilders in Spain. The hulls of these 27,079 tonne vessels were built in Spain and shipped to Melbourne for installation of the island superstructure and internal fitout by BAE Systems. At present it is planned to operate helicopters from these ships, to be commissioned as HMAS CANBERRA and HMAS ADELAIDE. After some speculation that the prominent ski jump would be deleted from the design, both ships retain it. Further speculation surrounds the possibility of Australia buying the F-35B as a component of its proposed order for one hundred F-35s. Speaking to *The Weekend West* newspaper on 17 May 2014, Defence Minister Senator David Johnston raised the possibility of Australia acquiring a number of Lockheed Martin F-35Bs for operation from the LHDs. Senator Johnston stated that the acquisition of the F-35B was '...an option which has been considered from day one.' In this current strategic environment such a purchase would appear not only sensible but necessary.

CHINA

Originally laid down in 1985 by the Soviet Union as the VARYAG and launched in 1988 the ship was purchased by China from the Ukraine in 1998. After a long period of refurbishment she was commissioned as the LIAONING in 2012. She displaces 67,500 tons at full load and can

carry a maximum of fifty four aircraft. The current status of the LIAONING remains a conundrum. Whilst she does not have the full spectrum of capabilities, she appears to be far more useful than her description by the Chinese authorities as being a mere 'training carrier'. The future of Chinese carrier aviation is assured with the proposed construction of the two Type 001A carriers. These vessels will be built to the same pattern as the LIAONING with one significant difference, they will be completed with a waist catapult. Whilst the notion of China progressing so quickly towards operating a CATOBAR equipped carrier would appear unlikely, the Chinese Navy has had access to such technology. The former HMAS MELBOURNE was sold to China in 1985 with the catapult, arrestor gear and mirror landing sight intact. The carrier itself was not broken up until 2002. Reports suggest that the equipment necessary for CATOBAR operations had been removed when this occurred. A catapult would permit fighters to be launched at heavier all up weights as well as for a fixed wing AEW aircraft to be deployed. The Type 001A may be of the same pattern as ULYANOVSK, a carrier 20 per cent complete when the Soviet Union collapsed. The ULYANOVSK was subsequently scrapped. In addition to these full size carriers the Chinese Navy is building two new 35,000 tonne LPDs which are very similar in design and size to the USN's *Wasp* class. These may operate STOVL versions of the J-31, a Chinese equivalent to the F-35.

INDIA

The year 2013 marked two watershed moments for the Indian Navy. Over five years late, India finally took delivery of the 44,500 tonne INS VIKRAMADITYA. The ship was formerly the Russian ADMIRAL GORSHKOV, a *Kiev* class STOVL carrier heavily modified for STOBAR operations. In addition, the first of two locally built Indigenous Aircraft Carriers (IACs) was launched. The first IAC(I), the VIKRANT (taking her name from India's first carrier – see below), is a 40,000 tonne carrier capable of carrying a maximum of thirty aircraft. She is built in STOBAR configuration and will enter service in 2017. There are plans to build the much larger IAC(II) of 65,000 tonnes, entering service in 2022. Despite the considerable delays to India's carrier programmes, more than any other country she provides a salutary lesson for current and prospective operators of aircraft carriers. India is the only nation to have experience of CATOBAR, STOVL and STOBAR operations. Prior to the 1989 retirement of the Bregeut Alizé ASW aircraft and the subsequent addition of a ski jump, the Majestic class carrier INS VIKRANT retained a catapult and arrestor gear and operated a mix of Conventional Take Off and Landing (CTOL) and STOVL aircraft. Having had experience of all three configurations the IAC(II) will

The 30,000tonne Italian aircraft carrier CAVOUR with seven large EH-101 ASW helicopters and nine AV-8B Harrier II fighters on her deck. The ship is also designed to act as an amphibious helicopter carrier assault ship when required.



be equipped with catapults and arrestor gear. This indicates that the well-known limitations of STOVL and STOBAR operations cannot be overcome and the use of catapults and arrestor gear is the most effective method of launching and recovering aircraft at sea.

UNITED KINGDOM

I wrote extensively on the future of UK carrier operations in my article *The Queen Elizabeth Class CVF, An Excellent Design Poorly Executed* (THE NAVY April-June 2014, Vol 76 No 2). Since the publication of that article there have been two positive developments. On 4 July 2014 QUEEN ELIZABETH was named at Rosyth by HM Queen Elizabeth II. Thirteen days later the ship was floated out and docked nearby to begin a two year period of fitting out. The second encouraging development concerned her sister-ship the PRINCE OF WALES. During a press conference held on 5 September 2014, following a NATO summit in Wales, the UK Prime Minister David Cameron, ended years of uncertainty surrounding the future of the second carrier by announcing that she too would enter service. This would ensure that the RN always have one operational aircraft carrier and in times of emergency put both to sea.

UNITED STATES

The USN has commissioned no less than twenty one large fleet carriers into service since 1945 and currently operates the world's largest fleet of aircraft carriers and assault ships. Despite the substantial size of the force the USN faces uncertainty with regard to the future of its carriers. Retirement of the KITTY HAWK in 2009 and ENTERPRISE in 2012 reduced the number in service to ten active carriers, the lowest number since the end of WWII and less than the often stated desired minimum of eleven. As recently as 22 January 2012 the then US Defense Secretary, Leon Panetta, told sailors aboard the ENTERPRISE that the US was committed to keeping a minimum of eleven carriers. This was, in part, to be able to project sea power against Iran should the need arise. With projected retirements and budgetary cuts this now appears to be a pipedream. The induction of the GERALD R FORD into service in February 2016 will see the number of carriers transitorily rise to eleven. The Chief of Naval Operations, Admiral Jonathan Greenert, stated the two year delay in completing her is due to budget difficulties. These same budgetary problems have delayed the Refuelling a Complex Overhaul (RCOH) of the ABRAHAM LINCOLN. This

will have a flow on effect in delaying the scheduled refit of the GEORGE WASHINGTON. The reason for the defence cuts lies with the Budget Control Act of 2011 which effectively enacts automatic spending cuts to lower the US deficit. This process is known as sequestration and has had a dramatic effect on all branches of the US military. On 4 August 2013 the Defense Secretary Chuck Hagel warned that the number of carriers could be reduced to either eight or nine because of sequestration. Most likely candidates to be retired would be the GEORGE WASHINGTON, JOHN C STENNIS and HARRY S TRUMAN. With the retirement of these ships there would be a consequent reduction in the number of air wings required. The current five year carrier building cycle, already delayed because of sequestration, could be further extended thus meaning that with one ship in RCOH the number of available carriers might drop to as low as seven or six. Nevertheless, the USN's nuclear powered supercarriers equipped with the most capable JSF variant, the F-35C will remain the world's most powerful ships ever built. The loss of these large carriers may be partially offset by the employment of LHDs functioning in the role of small carriers. In the 2014/15 timeframe the eight *Wasp* class LHDs will begin operating the F-35B STOVL fighter. The successor to the *Wasp* class, the first of which, USS AMERICA, is notable in that it no longer incorporates a well deck for amphibious vehicles. This permits the carriage of more aircraft, particularly the larger types, the F-35 and Osprey. Operating as small carriers with a complement of 20 F-35Bs and two Sikorsky UH-60S helicopters, the America class could successfully be deployed into conflict zones where the USN's super carriers were either deemed to be unnecessarily large for the task or were unavailable.

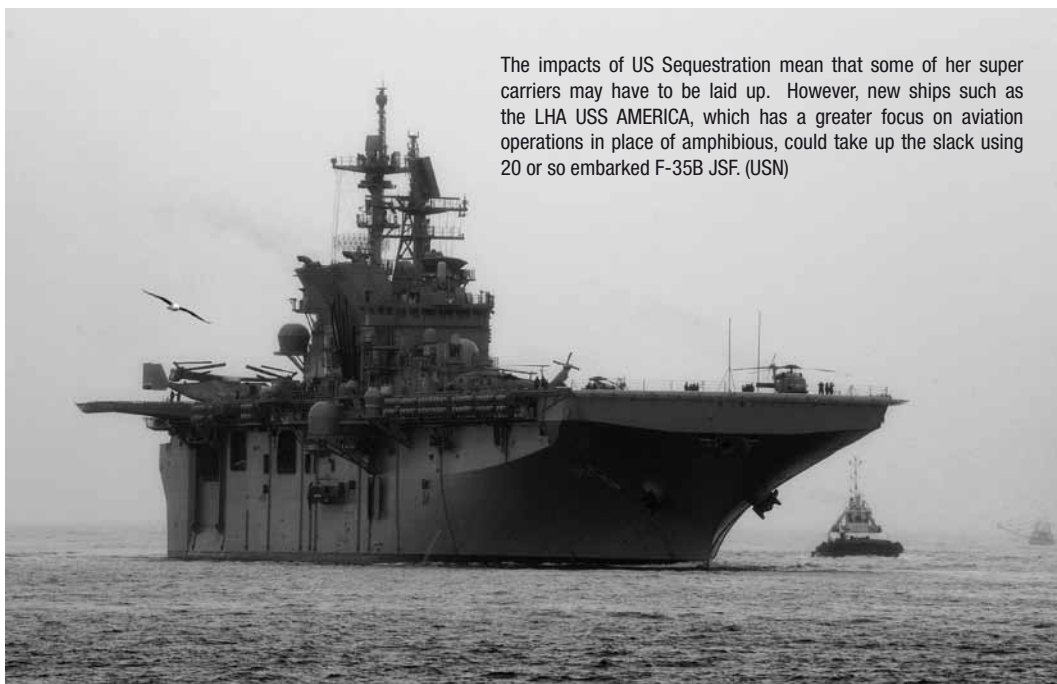
CONCLUSION

In addition to those nations described above, Brazil and Russia have intentions to build new aircraft carriers around the turn of the decade. Turkey has ordered an LHD from Navantia in Spain to the same pattern as the *Juan Carlos* and *Canberra* class. She too has F-35s on order, some of which could be of the STOVL variant, thus paralleling Australia's possible future carrier operations. Japan and Korea operate impressive LPD vessels and while there is no current intention for them to operate fixed wing aircraft, both nations have F-35s on order and could thus follow the pattern of other nations in splitting their order in favour of a small number of the 'B' variant. Notable among the other countries with aircraft carriers is Italy. She operates the ITS GIUSEPPE GARIBALDI of 13,850

tonnes and the much larger LPD, the ITS CAVOUR of 30,000 tonnes (full load). The latter is a very impressive vessel able to carry a maximum of 30 aircraft. Like the UK, Italy has opted to operate the F-35B, 15 of which are to be purchased for operation from the CAVOUR.

The value and worth of aircraft carriers is now undisputed. The navies of the world will thus be divided into those which have the full range of capabilities which are offered by the operation of a carrier and those without. In any future conflict it is the latter which will be found severely wanting in the projection of sea power. ■

The impacts of US Sequestration mean that some of her super carriers may have to be laid up. However, new ships such as the LHA USS AMERICA, which has a greater focus on aviation operations in place of amphibious, could take up the slack using 20 or so embarked F-35B JSF. (USN)



MATCH: HMAS CANBERRA JOINS THE FLEET

Governor General of Australia, His Excellency General the Honourable Sir Peter Cosgrove, AK, MC (Retd), together with the Prime Minister of Australia, the Hon Mr Tony Abbott, MP, were the guests of honour on 28 November 2014 as Australia's first Landing Helicopter Dock (LHD) was welcomed into service in the Royal Australian Navy.

The Australian White Ensign was raised for the first time, signaling that HMAS CANBERRA III was formally commissioned into the Fleet. Navy, Army and Air Force members of ship's company lined the aircraft hangar as invited guests witnessed the historic event.

Chief of Navy, Vice Admiral Tim Barrett, AO, CSC, RAN, said the commissioning was a step towards developing the future of the Navy. "HMAS CANBERRA is an exciting addition to the Royal Australian Navy. This very capable ship will serve the nation well for decades to come," he said.

Commanding Officer, Captain Jonathan Sadleir, AM, RAN, said it was also a significant moment for the tri-service ship's company who had been training for months in preparation for the introduction of the LHD. "It was a proud and emotional experience for me to stand with 400 exceptional members of my crew today.

"Through the efforts of many organizations, this outstanding ship is now a reality," Capt Sadleir said.

The ship brings a significant increase in amphibious potential to the Australian Defence Force.

"We know it's an awesome ship with huge capability, but the next step is to go to sea and test procedures, refine and consolidate, so we can be ready when the nation needs us," he said.

HMAS CANBERRA will proceed to sea in the coming weeks for a period of training and assessment for the crew.

CANBERRA is first of two LHDs to be introduced into the Navy. The ship is expected to be used for diverse tasking such as humanitarian assistance, disaster relief and amphibious operations.

CANBERRA is capable of embarking more than 1,000 combat ready troops and associated armoured vehicles and cargo which can be landed ashore by helicopters or state of the art LCM-1E landing craft. She is the third ship to bear the name.



An historic moment, Commanding Officer HMAS CANBERRA, Captain Jonathon Sadleir RAN, about to receive the Australian White Ensign from Petty Officer Communications and Information Systems Chole Oliver during the commissioning ceremony onboard HMAS CANBERRA at Fleet Base East, Sydney. (RAN)

CANBERRA arriving in Sydney for her commissioning into the RAN. (RAN)



DISPATCH: FINAL FAREWELL FOR LANDING CRAFT

As the sun slipped below the horizon, the Australian White Ensign was lowered for the final time on Navy's three remaining Landing Craft Heavy (LCH) during November 2014.

Past and present crew from HMA Ships BRUNEI, LABUAN and TARAKAN watched from the HMAS CAIRNS quarterdeck as the ships were decommissioned after almost forty years of service.

The Assistant Minister for Defence represented the Prime Minister and was joined by the Member for Leichhardt. Commander Australian Fleet, Rear Admiral Stuart Mayer, Head Navy Capability, Rear Admiral Mark Campbell, and the Secretary of the Papua New Guinea Department of Defence, Mr John Porti also attended.

In his address, Commanding Officer HMAS BRUNEI, Lieutenant Commander Matthew Richardson said the three Balikpapan class vessels had a rich past.

"These ships have travelled over one and a half million miles between them, which is quite a bit, at 10 knots flat out. Over the years 100 Commanding Officers and nearly 4,000 crew members have served in them.

"Having commissioned way back in 1972, BRUNEI, LABUAN and TARAKAN are the number one, number two and number three longest serving ships in the history of the Royal Australian Navy. The ships have consistently served Australia around our waters and across the region, usually attending to the less glamorous but often the most appreciated operations, from cyclone relief, to regional assistance as well as military and border protection operations," Lieutenant Commander Richardson said.

"The ships have had long and distinguished careers, but tonight, I'm most proud of the crews. It takes a special kind of sailor to work in these platforms, sometimes for several years, where there are no freeloaders allowed and everyone is expected to help everyone else.

"Despite bad backs, poor hearing, cramped conditions and a complete lack of sleep from that crazy pounding that only an LCH sailor understands, the sailor remains the most resilient most adaptable sailor I have ever worked with," Lieutenant Commander Richardson said.

Rear Admiral Mayer also paid tribute to the personnel who had served in the landing craft.

"You are the ones that have, for the past forty years, given practical expression to amphibious warfare by contributing to ADF operations in our region including the Solomon Islands, Bougainville and East Timor; these could not have been successful without the mighty LCH and that dedicated crews that serve in the. When a job seemed too hard to be done, the 'H's' found a way," Rear Admiral Mayer said.

"Whether it was disaster relief, delivery of humanitarian assistance, supporting dive teams, survey teams or lifting loads to remote locations the H's found a way. From the Solomon to Suai, from Kimberley to Norfolk Island, always the H's found a way."

"You are the ones that have been the heart and soul of the Australian Defence Force's amphibious capability. It is a record of service for which I am grateful. It is a record of service of which you should be very proud," Rear Admiral Mayer said.

"The decommissioning of BRUNEI, LABUAN and TARAKAN marks the end of a chapter in the Royal Australian Navy's history. While the ships will decommission, the crews will not. The skills and traditions, and I have no doubt the same sense of adventure will continue to be present in the new LHDs CANBERRA, ADELAIDE and the LHD Landing Craft that support them. These new ships may be bigger, but they are just metal without the crews that bring them to life."

"As we say goodbye to the LCH after four decades of service, I would like to thank not just the crews, but the engineers and logisticians who have sustained them," Rear Admiral Mayer said.

Following the decommissioning, LABUAN will be gifted to the Papua New Guinea Defence Force Maritime Operations Element to strengthen their sealift capability. A combined Australian Navy and Papua New Guinea crew will sail the vessel to its new home.

The personnel posted to the craft will take on other roles across the fleet as Navy prepares for the introduction of the LHD and its embarked landing craft. ■



The ships companies of HMA Ships BRUNEI, LABUAN and TARAKAN man ship at the beginning of the decommissioning ceremony at HMAS CAIRNS. (RAN)

The Navy League is intent upon keeping before the Australian people the fact that we are a maritime nation and that a strong Navy and capable maritime industry are elements of our national wellbeing and vital to the freedom of Australia. The League seeks to promote Defence self reliance by actively supporting defence manufacturing, and the shipping and transport industries.

The strategic background to Australia's security is changing and in some respects has become less certain. The League believes that Australia should pursue the capability to defend itself, paying particular attention to maritime defence. Through geographical necessity Australia's prosperity, strength, and safety depend to a great extent upon the security of the surrounding seas and island areas, and on unrestricted seaborne trade.

The Navy League:

- Believes Australia can be defended against attack by other than a major maritime power and that the prime requirement of our defence is an evident ability to control the sea and air space around us and to contribute to defending essential lines of sea and air communication with our allies.
- Supports a continuing strong alliance with the US.
- Supports close relationships with all nations in our general area and particularly New Zealand, PNG and the island States of the South Pacific.
- Advocates the acquisition of the most capable modern armaments, surveillance systems and sensors to ensure that the ADF maintains technological advantage over forces in our general area.
- Advocates a significant deterrent element in ADF capability enabling powerful retaliation at significant distances from our shores.
- Believes the ADF must be capable of protecting commercial shipping both within Australian waters and beyond, recognising that this means in conjunction with allies and economic partners.
- Endorses the control of coastal surveillance by the ADF, and the development of the capability for the patrol and surveillance of all of Australia's ocean areas, its island territories and the Southern Ocean.
- Welcomes Government initiatives concerning the recovery of an Australian commercial fleet capable of supporting the ADF and the carriage of essential cargoes to and from Australia in times of conflict.
- 20 offshore combatant ships, 6 heavy landing craft and substantial numbers of naval combatant and ASW helicopters.
- Strongly supports the acquisition of large, long range and endurance, fast submarines and, noting the deterrent value, reliability and huge operational advantages of nuclear powered submarines and their value in training our anti-submarine forces, urges the consideration of nuclear power as an option for those vessels.
- Notes the potential combat effectiveness of the STOVL version of the JSF and supports further examination of its application within the ADF.
- In order to mitigate any industry capability gap following the completion of the AWD program, recommends bringing forward the start date of the planned future frigate (Anzac replacement) program, recognising the much enhanced capability projected for these ships.
- Urges that decisions to enhance the strength and capabilities of the Army and Air Force and to greatly improve the weaponry, and the intelligence, surveillance, reconnaissance, cyberspace and electronic warfare capabilities of the ADF be implemented.
- Supports the development of Australia's defence industry, including strong research and design organisations capable of the construction and maintenance of all warships and support vessels in the Navy's order of battle, and recognises the fundamental importance of a stable and continuous shipbuilding program for the retention of design and building skills and the avoidance of costly start up overheads.
- Supports the efforts by Navy to rebuild the engineering capability to ensure the effective maintenance and sustainability of the fleet.
- Advocates the retention in preservation (maintained reserve) of operationally capable ships that are required to be paid off for resource or other economic reasons.
- Supports a strong Naval Reserve and Australian Navy Cadets organisation.
- Advocates a strong focus on conditions of service as an effective means of combating recruitment and retention difficulties.

As to the RAN, the League, while noting the vital national peacetime tasks conducted by Navy, including border protection, flag showing/diplomacy, disaster relief, maritime rescue, hydrography and aid to the civil power:

- Supports the concept of a Navy capable of effective action in war off both the east and west coasts simultaneously and advocates a gradual build-up of the fleet and its afloat support elements to ensure that, in conjunction with the RAAF, this can be sustained against any force which could be deployed in our general area.
- Welcomes the announced increase in Defence expenditure to 2% of GDP over the next 10 years.
- Believes that the level of both the offensive and defensive capabilities of the RAN should be increased and is concerned to see that the substantial surface and sub-surface capability enhancements contained in the 2009 Defence White Paper should survive the forthcoming 2015 Defence White Paper; in particular a substantially strengthened submarine force, 3 Air Warfare Destroyers (AWDs), 2 landing ships (LHDs), 8 new frigates (Anzac class replacements),

The League:

- Calls for a bipartisan political approach to national defence with a commitment to a steady long-term build-up in Australia's defence capability including the required industrial infrastructure.
- While recognising budgetary constraints believes that, given leadership by successive governments, Australia can defend itself in the longer term, within acceptable financial, economic and manpower parameters.



An impressive sight. A new MH-60R Seahawk 'Romeo' helicopter flying near the new LHD CANBERRA. (RAN)



HMA Ships ANZAC (right) and ARUNTA (left) together off Albany WA for the 100th anniversary convoy commemoration event. The prominent mast structure amidships indicates that both ships have completed the Anti-Ship Missile Defence (ASMD) upgrade and are easily amongst the most capable ASMD ships in the world. (RAN)



THE NAVY LEAGUE OF AUSTRALIA

EIGHTH ANNUAL MARITIME AFFAIRS ESSAY COMPETITION 2015

The Navy League of Australia is holding the eighth maritime essay competition and invites entries on either of the following topics:

TOPICS

- 20th Century Naval History
- Modern Maritime Warfare
- Australia's Commercial Maritime Industries

CATEGORIES

A first, second and third prize will be awarded in each of two categories:

Professional, which covers Journalists, Defence Officials, Academics, Naval Personnel and previous contributors to *THE NAVY*; and

Non-Professional for those not falling into the Professional category.

Essays should be 2,500-3,000 words in length and will be judged on accuracy, content and structure.

PRIZES

- **\$1,000, \$500 and \$250** (Professional category)
- **\$500, \$200 and \$150** (Non-Professional category)

DEADLINE

20 September 2015

Prize-winners announced in the January-March 2016 issue of *THE NAVY*.

Essays should be submitted either in Microsoft Word format on disk and posted to:

Navy League Essay Competition
Box 1719 GPO, SYDNEY NSW 2001

or emailed to editorthenavy@hotmail.com.

Submissions should include the writer's name, address, telephone and email contacts, and the nominated entry category.

THE NAVY reserves the right to reprint all essays in the magazine, together with the right to edit them as considered appropriate for publication.

