

# THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA



**THE MCG  
PROBLEM**

**RETURN TO  
THE SEAS**

**BUILDING  
THE QUEEN  
ELIZABETH  
CLASS**

**AUSTRALIA  
AND AEGIS  
BALLISTIC  
MISSILE  
DEFENCE**



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## THE NAVY LEAGUE OF AUSTRALIA

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

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# THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA

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**HMAS ANZAC conducting a 5-inch gun live firing mission in the East Australian Exercise Area during the 2010 Fleet Concentration Period. (RAN)**

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## THE NEED FOR NGS

During October last year the Canberra based airpower think tank "The Williams Foundation" held a conference entitled "Australia's LHDs and ADF Aviation". It had an impressive line-up of speakers from the three services as well as input from a visiting Royal Marine Brigadier specialising in helicopter assault operations from ships at sea.

During the day-long conference it was interesting to note the individual Services' different attitude towards the LHDs, CANBERRA and ADELAIDE. The Navy's view was that it will be a big change in the way it conducts itself, and despite its present frigate navy status, is up to the challenge. Disappointingly, Navy also stated it had no policy or intention for fixed wing operations from the LHDs.

Army's view was that it cannot get onto the LHDs quick enough to start operating from them. Their representative, Major General John Caligari, had had experience with LHD operations during a previous *Talisman Saber* exercise off the Queensland coast with the USN, and from that had already been able to identify weaknesses in the ADF's doctrine on amphibious operations. He even touched on the fact that having your fixed wing close air support on deck was better than having it hundreds of miles away. The inference being that in certain operations not having that support on deck will be a limiting factor for the ADF's tactical employment of the capability.

RAAF's view was a little disappointing. It said that it could only support LHD operations if they were being conducted within 600nm of an airbase (which begs the question why you would need an LHD at all). While this is probably true at no point was it suggested that RAAF could or would perhaps investigate ways to use the LHDs as forward operating bases to support troops ashore in the face of the enemy.

Of course the elephant in the room was the STOVL (Short Take Off and Vertical Landing) F-35B JSF. At no point was this unique capability raised

by speaker or audience member except, curiously, during the breaks when the conference convenors played video footage of the F-35B conducting its first at sea vertical landing onboard a USN LHD. At the time this footage was only days if not hours old and was repeated again and again. If the organisers were hopeful of a debate on STOVL JSF from the LHD then they would have been sadly let down.

One of the key points to come from the conference was from retired Major General Jim Molan, who was part of the audience. During one of the question and answer sessions he suggested that given the tactical limitations in the ADF's LHD employment capability, the ADF needs to articulate those limitations to government in order to manage political perceptions. He cited the example of the Howard Government's surprise at the limitations of the ADF when looking for options to participate in the second Iraq war. A future government looking for amphibious options needs to know that beyond 600nm of a friendly and well equipped air base the LHDs cannot be supported with airpower. This could mean the mission does not go ahead.

One way the ADF could mitigate against this limitation is through a reinvigoration of the naval gunfire support (NGS) capability. The RAN has, for many decades now, been a frigate navy. The guns employed on our ships have thus been lightweight, medium to lower calibre, dual purpose guns - their lineage being in the anti-aircraft role. Over time as the guns became radar controlled they became more accurate, which negated the need for large calibres and high rates of fire in that role. It also meant ships only employed one gun. This accuracy has seduced many navies into the promise of precision standoff, which is fine for air power strikes using 2,000lb bombs but most naval shells these days are only 60lbs. However, troops in contact with the enemy not only need precision, they need suppression.

Effective suppression fire consists of weight of fire and rate of fire. Precision and standoff are better for the ship than those being supported.



The USN Iowa class battleship USS MISSOURI firing a broadside. The USN resurrected the Iowa class battleships numerous times post WWII to provide NGS for troops in contact. Although not available any more, having this much firepower to support an amphibious operation could easily mean the difference between victory and defeat. (USN)



Light enough for one man to pick up, the 5-inch shell as used by the RAN for NGS. Fine for anti-aircraft fire but not so appropriate to support troops in contact for suppression fire. (RAN)

It's easy to understand how this came about. The USN has long been the leader in naval technology and concepts. Many navies are thus quite happy to follow what the USN does. In this case, the USN has concentrated on the 127mm (5-inch) gun (for dual purpose tasks but predominantly for anti-aircraft). However, many seem to have overlooked the point that the USN operates as a spread of systems. For its troops



A computer generated image of the proposed 155mm lightweight AGS for the USN's new Flight III Arleigh Burke class Destroyers. (BAE)

going ashore they have organic fixed wing air support. They also tend to deploy 100,000 tonne super carriers with 80 fixed wing high performance aircraft. No navy can do this nor has had to find out the hard way since WW II that this system is how the USN is able to achieve what it can. So the relatively medium – lower calibre 5-inch gun with its low rate of sustained fire is still popular.

Of course the USN has at times realised it needed weight and rate of fire for its amphibious operations. It was able to achieve this through the reintroduction of the Iowa class battleships for the Korean War, Vietnam War, Cold War and off Iraq for the first Gulf War. It also sees a continuing requirement with two massive 155mm gun systems for each of its projected DD-21 Zumwalt class destroyers. Each gun turret has a maximum sustained rate of fire of 10 rounds a minute through a water cooled barrel out to 60nm.

To understand the ADF's inadequacies in NGS capability one only needs to go back to 2003 to the second Iraq war. The UK's 3 Commando Brigade was tasked to assault the Al-Faw peninsular which guarded a strategic waterway into Iraq. To support the Brigade's helicopter borne assault four frigates, including HMAS ANZAC, were used for NGS, plus four 155mm gun batteries (six guns each) from a nearby island, and aircraft from the super carrier USS CONSTELLATION. Enemy positions had also been subject to intense air bombardment from USN and USAF aircraft and USMC attack helicopters before the assault.

Opposition was light and 3 Commando Brigade's mission was successful. But it's easy to see how the RAN/ADF is potentially deficient for fire support for such an operation given how much was deployed to support the heli-borne assault against such light opposition. Based on the coalition resources used to take the Al-Faw peninsular against a relatively minor force, a basic anti-access strategy by a potential enemy could have Australia's considerable efforts to build an amphibious capability come to nothing.

One of the first opportunities Navy has to reinvigorate the NGS capability is the SEA 5000 project to replace the eight Anzac frigates. The Italians currently make a very long range 127mm gun but with a water cooled barrel for a high sustained rate of fire. 155mm (6.1-inch) guns are also starting to make an appearance in naval service with the USN considering a lightweight 155mm gun system for their projected Flight III Arleigh Burke class destroyers. Interestingly, the Australian Army recently decommissioned its entire 105mm artillery capability in favour of the larger 155mm calibre to support its troops. Navy probably needs to take note of Army's lead as it has deemed smaller calibres inadequate for support to land campaigns, remembering amphibious operations are even more complex and risky. ■

**The Annual General Meeting of the Navy League** and a meeting of the Federal Council of the League were held in Canberra on the 28th and 29th October 2011.

It was a well attended meeting much enjoyed by all present.

The League is very appreciative of the support given to our annual conference by Navy. The 2011 conference once again benefitted from Navy's involvement.

Immediately after lunch on Friday members of Federal Council went to Russell Offices to receive a briefing from Commodore Ian Middleton, the Director General, Navy Capability Transitions and Sustainment. This was an excellent two hour presentation.

On Saturday we were to have the Chief of Navy, Vice Admiral Ray Griggs join us. Unfortunately, though CN tried to make it, transport problems – it was the weekend of the Qantas shutdown - precluded him from attending. CN asked Rear Admiral Trevor Jones, Deputy Chief of Navy, to attend in his place.

Rear Admiral Jones took part in an extensive discussion with members of Federal Council on many issues concerning the Royal Australian Navy. Our discussions with DCN were, as they have been on prior occasions, entertaining and informative. Federal Council considered our meeting with DCN to be well worthwhile.

At our annual conference a great many matters are dealt with. These matters include; the League website; *THE NAVY* magazine; the history of the League project – we are 111 years old in Australia; a review of the League Statement of Policy which appears on the second last page in each edition of *THE NAVY* magazine; the celebration of the RAN's centenary and consideration of the other notable centenaries in 2013 and 2014; the search for the AE1; and all the usual administrative matters involved in running a national organization.

There is, of course, always a good deal of time taken in discussion of Navy matters. This year they included the progress of the Air Warfare Destroyers; submarines, the number to be obtained, their propulsion, their cost; off the shelf acquisition; cruise ship berthing at Fleet Base east; and the introduction into the Navy of two large amphibious ships. Each year the Federal Council of the League makes an award to the ship or establishment that it considers has made the best contribution to the community. Out of all the ships and establishments which enter, Navy short lists three for the consideration of Federal Council. The three finalists

for 2011 were HMAS CERBERUS, HMAS ALBATROSS and AWARE 2. It is no easy task weighing the respective efforts of large establishments with that of a patrol boat crew.

This year the winner of the Navy League of Australia Perpetual Trophy – Community Award is AWARE 2. In making this award Federal Council recognised the community contribution of a relatively small number of people who in the course of their work necessarily have to move around a great deal. Our congratulations to AWARE 2.

A well done to both HMAS CERBERUS and HMAS ALBATROSS. The League acknowledges that each year these establishments make a notable contribution to their communities

The other award decided at our conference was the 2011 Maritime Essay Competition. The Award is given in two categories, Professional and Non-Professional.

The First prize in the Professional section was awarded to CAPT George Galdorisi USN and Edward H. Feege for their essay *Australia and Aegis Ballistic Missile Defence; Preparing for the Indo-pacific Century*.

Second prize went to Greg Swindon for *The Australian Navy Serving Ashore*

Third prize was awarded to Murray Dear for his essay *War in the Southern Latitudes*.

In the Non-Professional section for the first time it was decided to award only a first and second prize.

First prize was awarded to Nigel Beeke for *The ordeals of HMAS AUSTRALIA (Kamikaze)*.

Second prize went to Geoff Crowhurst for *Who Sank I-178?*

All the winners are to be congratulated on their work. The readers of *THE NAVY* will have the opportunity of appreciating the winners' works as they will be published in the magazine

At our annual meeting of Federal Council each State Division of the League reports on its activities. It was pleasing to receive from each State an account of the many varied and different ways they are contributing to the strength of the League and to the maritime wellbeing of Australia.

The conference was considered by all to be a great success – even by those members of Federal Council who had to wait a day or two to get home after the Qantas shutdown!

**The next annual conference will be held in Canberra in October 2012.**



The class photo of the 2011 Navy League AGM (from left to right) RADM Andrew Robertson (NSW); Mr Bill Dobbie (NZ); Mr Dean Watson (SA); Mr Bill Gale (WA); Mr Harvey Greenfield (QLD); Robert 'Otto' Albert (NSW); Mr John Jeremy (NSW); Mr Graham Harris (Fed President); Mr Trevor Vincent (WA); Mr Mason Hayman (WA), and RADM David Holthouse (Federal Vice-President). Missing Mr Matt Rowe - Federal Vice-President.

# THE MCG PROBLEM

By Anthony Williams

**In future naval gunfire support missions undertaken by the RAN in support of LHD operations size will matter. While many are captivated with precision, the indirect fire support gun has never needed it. Rather weight and rate of fire have been more important. Anthony Williams takes a look at the current market for NGS and asks is what the West uses now adequate and what is the future?**

What exactly is “the MCG Problem”? MCG is the shorthand for Medium Calibre Gun - that is, between the light anti-aircraft cannon of up to 40mm calibre and the heavy guns of 6” (152mm) and upwards which have now been retired along with the last of the cruisers and battleships which carried them. The current weapon in the RAN is of course the 5-inch (127mm) Mk-45, with other nations selecting guns from 57mm to 130mm calibre. So why is it a problem? Because navies around the world can’t agree about what the MCG is for, and therefore what kind of weapon is needed.

There have always been arguments about MCGs. During the Second World War, before missiles were even a distant dream (or nightmare), guns ruled. A wide variety of MCGs were used, the principal calibres in the RN being 3”, 4”, 4.5”, 4.7” and 5.25” (76-133mm). The reason for such a diversity was the constant debate between the advantages of shell weight, for anti-ship purposes, and rate of fire, for dealing with aircraft.

By the end of the War, the proven danger from enemy aircraft had led to most MCGs being fitted in high-angle mountings to produce DP (dual purpose) weapons, capable of both surface and AA fire.

## POSTWAR DEVELOPMENTS

After the Second World War the Allies had time to reflect on the lessons. It had become painfully apparent that MCGs had to be able to put up a high volume of fire against aircraft. This led to much activity in developing automatic loading mechanisms to speed up the rate of fire, a phase which faded after the 1950s (except for smaller calibres) because of the expectation that guided missiles would take over the AA role.

Furthermore, the new proximity fuzes meant that the old concept of barrage fire - putting up a curtain of high explosive in the path of attacking aircraft - was no longer appropriate. Shooting had to be sufficiently accurate to ensure very near misses, and that meant a high muzzle

The USS FORREST SHERMAN firing her Mk-45 Mod 4 5-inch (127mm) gun. The Mk-45 Mod 4 is lightweight and accurate but its rate of sustained fire is potentially too low to provide suppression fire in the NGS role. (USN)





The RN Type 22 Batch 3 frigate HMS CORNWALL. The Type 22 class originally had no gun. However, experience in the Falklands Campaign proved the need for ships to retain an NGS capability. (RN)

velocity to minimise the time of flight of the shell. The combination of high rate of fire and high muzzle velocity was technically difficult to achieve and took years of development to perfect. In the meantime, the Royal Navy (and for a while the RAN) relied on the semi-automatic twin 4.5" Mk.VI DP as the standard armament for postwar frigates and destroyers. This was capable of a rate of fire of 20 rounds per minute (rpm) per gun, nearly double that of earlier mountings, but still only half that of contemporary fully automatic guns such as the American single 5" (127mm) Mk-42 and the Swedish twin 120mm.

Despite the undoubted success of the 4.5" Mk.VI mounting, it has to be said that its longevity was due more to accident than design. During the 1950s the Navy planned several fully-automatic weapons which saw little or no service use. Various 5" (127mm)

calibre designs were considered, with rates of fire up to 60 rounds per minute. A 4" (102mm) Vickers gun, with a 45 rpm rate of fire, was built but sold only to Chile. The twin 3" (76mm) Mk-6, designed for up to 120 rpm (although 90 rpm was more usual), was adopted (at the time, the minimum calibre worth fitting with a proximity fuze), but only as the secondary armament of the three Tiger class cruisers, which also carried automatic 6" guns capable of 20 rpm. The USN developed a similar 3" weapon using the same ammunition, but this was unsuccessful and had a very short life.

## CURRENT WEAPONS

During the 1960s two completely different schools of thought developed among the world's navies. In one corner were the Americans and the British, who believed that missiles or carrier aircraft would be the primary armament in dealing with both aircraft and enemy warships. This meant that the MCG would mainly be used for shore bombardment with a backup role in dealing with smaller ship targets not worth a missile. In fact both navies went through a period when they assumed that certain classes of warships did not need an MCG at all - which in the Royal Navy led to the first two batches of Type 22 frigates - but soon learned the error of their ways when the Falklands conflict re-emphasised the importance of naval gunfire. The third batch of the Type 22 acquired a 4.5" gun.

It should be noted in passing that the US Marines have always been strong proponents of shore bombardment in order to support

opposed landings. Their influence had much to do with the resuscitation of the 16" (406mm) gunned battleships in the 1980s and also led to other experiments with 8" (203mm) and 155mm naval guns. Other navies, including most of those in Western Europe, decided that the gun still had an important general purpose role and would need to deal with targets such as fast missile boats and even anti-ship missiles as well as aircraft.

These philosophies led to different approaches in gun design. The British and American requirement did not call for a high rate of fire, so their mountings, the 4.5" Mk-8 and the 5" Mk-45 respectively, achieve only 20-25 rpm but have the benefit of being simple and relatively light at around 25 tons, as well as low on manpower demands. The current Mod 4 mounting for the 5" gun has a longer (L/62 rather than L/54) barrel and a longer recoil stroke to cope with more powerful ammunition, with the rate of fire further reduced to 16-20 rpm.

The alternative approach has continued to stress rate of fire. The most recent, export version of the French Creusot-Loire 100mm Compact weighs only 14 tons (19 including the hoist and magazine) and has a rate of fire of up to 90 rpm. The Italian OTO Melara 76mm weighs just 7.5 tons, with a rate of fire in the latest "super-rapid" version of 120 rpm. The Italian gun has become something of an international standard weapon, seeing service in some three dozen navies.

Two attempts have been made to enjoy the best of both worlds. Oto Melara offer a 127mm gun, using the same ammunition as the American 5", but firing at a rate of 45 rpm. The penalty for this performance is a weight of 37 tons, although this has been reduced to 22 tons in the latest lightweight version. The Swedish firm of Bofors developed an even more spectacular weapon in the late 1960s, the 120mm single, in a 28.5 ton mounting, which fires at a still remarkable 80 rpm, but this saw very little use.

The Russians have covered all of the bases, developing modern, fast-firing automatic guns in 76mm (AK-176M: L/59 calibre, 120 rpm RoF), 100mm (AK-100: L/59, 60 rpm) and 130mm (AK-130: L/54, 84 rpm for twin mounting) calibres, but current production is focused on the 100mm A190(E). This weighs about the same as the older 76mm gun but claimed range and accuracy are doubled and lethality nearly so. Compared with the AK-100, it offers an increase in rate of fire to 80 rpm and three times the accuracy. It is also available with guided and rocket-assisted long-range shells.

Most navies have taken a fairly consistent view



The Bofors 57 mm gun. With a rate of fire of 220rpm the Bofors is one of the best small - medium calibre guns on the market for anti-air and anti-missile roles. With effective lower calibre guns such as these navies could increase the calibre of other gun systems to be more suitable of NGS/anti-surface roles. (USN)





A Mk-15 Block 1B Phalanx Close In Weapon System. With systems such as these the need for dual purpose guns is somewhat negated. (USN)

of their MCG requirements since the 1960s. One notable exception, however, has been the Canadians. Their first postwar escorts were fitted with 3" guns; either the fast-firing high-velocity British Mk-6 (which remained in Canadian service for far longer than with the RN) or the less advanced, but lighter, American Mk-33. The Iroquois class of the early 1970s saw a radical change with the adoption of the 127mm OTO Melara gun. When these ships were refitted in the late 1980s, the gun was replaced by the 76mm OTO Melara. Finally, the latest City class frigates are equipped with the 57mm Bofors gun, whose 220 rpm rate of fire makes it exceptionally effective against aircraft, missiles and fast patrol boats but of limited use in other roles.

## THE CURRENT DILEMMA

So which philosophy is correct; small calibre and high rate of fire or larger, slower-firing guns? The Falklands conflict provided evidence to support both viewpoints. The shore bombardment role (NGS = Naval Gunfire Support) was clearly important, with the 4.5" guns firing some 8,000 rounds. On the other hand, there was a desperate need for more close-range AA fire in the confined arena of San Carlos Water, where the 76mm OTO Melara or particularly the 57mm Bofors would have been in their element. Curiously, the 4.5" Mk-8 fire control system was reportedly optimised for AA fire and was not well designed for NGS, with four crewmen needed in the command centre to operate the weapon.

The Gulf War of 1991 was significant in many ways. The lack of air opposition clearly gave the advantage to the heavier cannon; it was the last

occasion on which a battleship fired its guns in anger. On the other hand, it was also the first time that a battleship was engaged by an anti-ship missile, fired from the shore, which fortunately failed to strike its target. Finally, the most significant aspect was the massive naval bombardment - carried out almost entirely by guided missile.

So where do we go from here? Specifically, what kind of gun should the next generation of warships be equipped with? In the case of the Royal Navy it could be argued that since the Falklands, the majority of warships have been equipped with Sea Wolf, and/or an anti-missile gun such as Phalanx or Goalkeeper, so the need for the MCG to engage in AA fire has disappeared. It could also be observed that both the Gulf War and the Falklands, where HMS GLAMORGAN was hit by an Exocet missile after

conducting an NGS task, demonstrated that shore bombardment has become a hazardous operation in many parts of the World. Anti-ship missiles can be launched from mobile land-based mountings and have a longer range than current naval guns, so perhaps the conventional large-calibre gun is becoming obsolescent.

The USN is examining the use of GPS-guided rockets for shore bombardment. The use of unguided missiles for this purpose is not, of course, a new idea as barrages of rockets were used for shore bombardment in the Second World War, but the modern versions have a much longer range and even the unguided ones, such as MLRS, are far more accurate. They can also carry a wide variety of payloads including anti-tank munitions.

What does that leave for the MCG to do? This is clearly the crucial question as it determines what sort of gun should be fitted. The range of possible roles for the MCG are: backup anti-aircraft and (possibly) anti-missile fire; destruction of small naval targets such as fast patrol boats; destruction of low-value ships not worth an anti-ship missile (as in the Falklands); backup anti-ship weapon in naval engagements; and shore bombardment when no enemy anti-ship missiles are expected.

The MCG also has the advantage of providing a more measured response than missiles, which is likely to prove increasingly important in the kind of United Nations or NATO "police actions" in which the Western navies are frequently engaged today. An anti-ship missile is an all-or-nothing weapon. A gun can fire warning shots or inflict limited damage in order to persuade a recalcitrant ship's captain of the error of his ways without going so far as to sink his ship. The same measured response can also be used in shore bombardment as was done in South Georgia, at the start of the Falklands conflict,



The German F-124 class frigate, HAMBURG, during build with a 155mm turret from a PZH-2000 self propelled-gun fitted on the bow. The fitting of the gun was part of a trial of the 155mm naval gun concept. However, the cost and complexity of the additional work to make the system viable was deemed too much for the project to continue.

The Russian Udaloy II class destroyer, RFS ADM CHABANENKO, firing her formidable AK-130-MR-184 twin 130mm gun.



when Argentine positions were bracketed in a display of force but deliberately not hit.

For such limited “demonstration” actions it doesn’t really matter what sort of gun is fitted, as long as there is one. At present, the 76mm OTO Melara continues to dominate in international sales but the 57mm Bofors is catching up, particularly in the USA (a previous 76mm user) where the Bofors has been selected for all three of the Coast Guard Cutter, DDG-1000 and Littoral Combat Ship programmes. In Russia, the St Petersburg “Arsenal” plant has developed a new 57mm gun (designated A-220) with a rate of fire of 300 rpm, intended for patrol boats. However, there is still strong interest in larger-calibre weapons for NGS, in the immediate future focused on 127mm guns but with the prospect of even larger calibres later on. The problem is that when it comes to serious naval action, the best type of MCG to have depends entirely on the circumstances and these cannot be predicted in advance. This suggests that a general-purpose weapon, with some capability in all possible roles, would be the best choice.

The most impressive Western MCG is probably still the 120mm Bofors - one wonders what it would be capable of today if its development had been continued. Of the current weapons, the French Creusot-Loire 100mm Compact seems on paper to have a lot to offer. The 13.5 kg shell is significantly lighter than the 21 kg of the British 4.5” or the 31.7 kg of the American 5”, but the 90 rpm rate of fire is four times as fast as the British weapon and the gun system is claimed to have anti-missile capability. Rather surprisingly, it seems to have been almost ignored in terms of international sales (although China appears to have copied

the design), and recently the 100mm guns have even been abandoned by the French Navy, which has chosen the 76mm OTO for its new FREMM frigates.

The best contender for current warships is probably the 127mm OTO Melara, as it combines the most powerful ammunition (the American 5”) with a reasonably high rate of fire. It is the closest Western weapon to the formidable Russian 130mm twin mounting. It is therefore the best choice for the anti-ship and shore bombardment roles, particularly as shore bombardment missiles, other than the extremely expensive Tomahawk, are a long way from service. Italy has selected a new lightweight version of this mounting for its next generation of warships, featuring a 64-calibre barrel but with the rate of fire reduced to 35 rpm (clearly, the requirements of land attack

are now dominating). The RAN uses the US Mk-45 Mod 2 127mm gun with a maximum rate of fire of 20rpm. For now, the Royal Navy has adopted a modified (all-electric mounting) Mod 1 version of the 4.5” Mk-8 and developed an extended-range (27 km) base-bleed shell, although a different gun seems likely to be fitted to the next class of warship (the Type 26 frigate), with the option of retro-fitting to the Type 45. At one time the 155 TMF was favoured (see below) but this was cancelled in 2010 so the US 5” or Italian 127mm gun seems likely to be selected. The main motivation for this change is presumably to avoid the continuing costs of developing and producing new ammunition for the small number of 4.5” guns in service.

## THE FUTURE

For the future, there is an alternative approach to this whole problem, based on the use of steerable, guided ammunition. The Americans have developed a laser-guided version of the 5” shell (which carries with it the problem that somebody, somewhere, has to illuminate the target with a laser) and the French reportedly considered an infra-red homing version of the 100mm shell, but it was never introduced. Other self-contained homing methods such as millimetre-wave radar may prove even more suitable. While early guided shells were steered by cumbersome flip-out fins, the American firm of Raytheon demonstrated shells as small as 40mm which can be steered in flight by means of tiny explosive charges. However, steerable canard fins now seem to be the popular choice. For NGS, the latest version of the American 5” (127mm) gun, the Mk-45 Mod 4, has a longer (62 calibre) barrel and can also tolerate higher firing pressures. In combination, these changes were expected to enable Raytheon EX-171

A test rig for the BAE developed TMF 155mm gun using the existing Mk-8 gun mount and systems. The system successfully passed a number of tests to indicate it was ready for production. However, the UK government cancelled the project.



steerable extended-range guided ammunition (ERGM), using GPS and INS position-fixing, to reach out to 63 nautical miles (117 km) with an error of only 20 metres. It was designed to follow a ballistic trajectory up to 70 km and a 'non-ballistic' trajectory (i.e flying...) after that. The projectile was 1.5 m long and thus needed a 'double stroke' of the loading system to ram it, thereby halving the rate of fire to 10 rpm for the first minute and only 2-4 rpm after that, as the high-energy charge overheats the barrel. The shell originally contained 72 EX-1 dual-purpose bomblets, but this was later replaced by a unitary blast fragmentation type warhead. However, it was announced in March 2008 that the project had been cancelled following a troubled development history.

In Europe, the Italians and the Dutch have developed the Vulcano, a family of HE fin-stabilised discarding-sabot (HEFSDS) 127mm rounds. This will include an unguided multi-purpose round with a range of up to 70 km (84 km from the L64 barrel), an IR-terminally guided anti-ship round with the same range, and an INS/GPS shore bombardment round with a range of up to 120 km from a 64 cal barrel (100 km from L/54). These are one-piece rounds which can be fired at 35 rpm in the new OTO-Melara lightweight gun.

The Italians are also developing the Davide anti-missile programme for the OTO 76mm gun (known as Strales in its export version). This uses a subcalibre DART (Driven Ammunition Reduced Time of flight) round fired at 1,200 m/s, rather similar in appearance to APFSDS tank gun rounds. Effective range is expected to be 5 km with engagements possible down to 2 m above the sea surface. On the face of it there is room for some concern about the effectiveness against anti-ship missiles of what must be a small (proximity-fuzed) warhead given the very high closing speeds, but they seem confident. A 'hit-to-kill' mode would seem preferable, but as the chosen guidance method is an RF beam-rider, it is probably not accurate enough for that at longer ranges. Development of a 40 km range fire support round is also being considered for the 76mm OTO.

The latest Russian development is the 130mm A192M(E), a single barrel mounting which, compared with the AK-130, is only one-third of the weight. It has a reduced rate of fire (optimised for anti-ship and shore bombardment) and stealth characteristics. In addition, long range guided projectiles are being developed for this weapon and the AK-130.

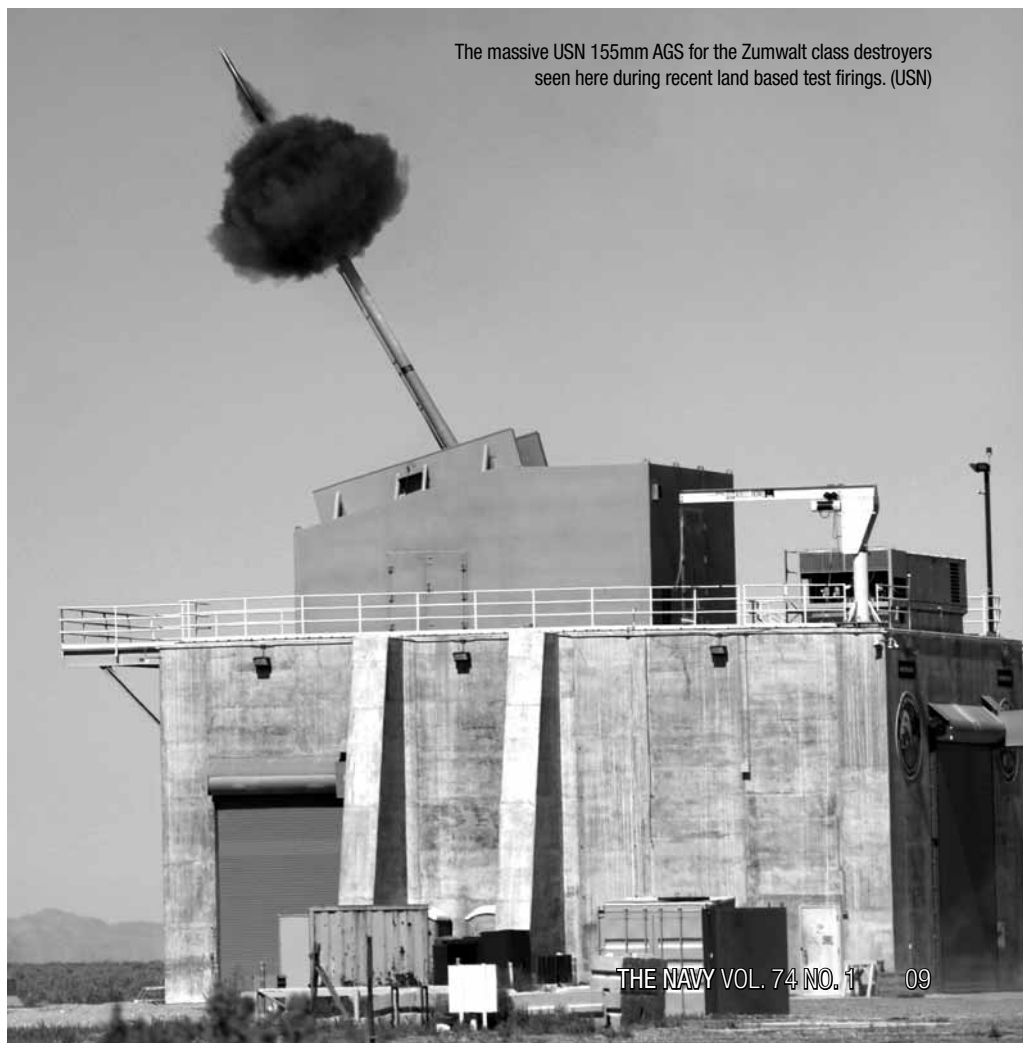
It was discovered late in 2006 that Russia has developed a new 152mm gun, with two barrels, vertically stacked. This gun has initially been developed for an army SPG, and in this form has a 50-round automatic launcher (the turret is unmanned) and can fire at about 15-18 rpm. There was also a proposed naval version, possibly intended as a replacement for the AK-130. It was being developed by Arsenal, and used a 'stealth' cupola. Range with existing ammunition was stated to be about 50 km, but NIIP was developing a new round capable of up to 70 km. These status of these guns is unclear.

Put all of these developments together and it is clearly technically feasible to design shells which can home in on their targets, be they ships, aircraft or missiles, as well as hit known fixed targets with precision. This has two implications for gun design. First, rate of fire is no longer so important as the kill probability of each shell will be many times higher. Secondly, if so much expensive electronics is going to be packaged

into each shell, then the best value is obtained by making the shell as large as possible.

The Russians already seem to be moving towards the 152mm calibre. For western nations, the logical calibre to choose would be 155mm, to obtain some commonality of projectiles and submunitions with the Army's artillery (a significant issue as guided projectiles, submunition carriers etc are expensive to develop and manufacture), and naval weapons of this calibre have recently been under development in both the USA and Europe. Modern long-range 155mm artillery shells can be fired to over 45 km - about the same as Exocet MM38. The new extended-range technology could more than double this engagement range; the new LRLAP (long range land attack projectile) fin-stabilised rocket-assisted guided shell being developed for use in the 155mm Advanced Gun System for the new DDG-1000 destroyers is expected to be capable of 180 km. It weighs 102 kg compared with 54 kg for the standard artillery shell. The AGS is a massive and complex system, weighing 95 tons for the turret alone (the barrel is liquid-cooled to permit a constant 10 rpm) and nearly 300 tons including a full 750-round magazine, so it will be for big ships only. Rather ironically, there are no current plans to use existing 155mm artillery shells in this gun.

A simpler alternative would appear to be to use existing turrets from army 155mm self-propelled artillery. BAE Systems proposed a weapon based on the British AS90 Braveheart SPG, intended to achieve 18 rpm. France also considered such a solution based on the turret of its GIAT 155mm/52 gun (19 tons unloaded) together with PELICAN guided ammunition, with a range of 85 km. The Germans actually mounted an 18 ton turret from their 155m PzH 2000 SPG to the F124 class frigate HAMBURG for demonstration purposes (made easier by their MEKO modular armament system for warships). The concept was known as MONARC (which stands for Modular Naval Artillery Concept for Naval Gun Fire), and is claimed to be capable of 10 rpm. However, the difficulties of adapting the turret for naval purposes led to the cancellation of the



The massive USN 155mm AGS for the Zumwalt class destroyers seen here during recent land based test firings. (USN)



The Italian OTO Melara 127mm/64 lightweight gun. The range and rate of fire of this gun, and its ability to use all existing US 5-inch ammunition, makes it an attractive alternative to the relatively low rate of fire USN Mk-45 series of guns.

project in 2007, and a decision to buy the 127mm/64 lightweight OTO naval gun instead for the German Navy's next class of warships.

Army turrets need considerable modification to compare with purpose-designed naval guns. The MONARC installation required the turret to be installed in a flexible mounting to help absorb the recoil. It is also necessary to fit a gun stabilising system to compensate for ship movement, and the ammunition storage and handling systems need to be modified. Perhaps the most obvious difference is that army guns do not use naval-style fixed ammunition (i.e. the cartridge case and projectile fixed together so they can be mechanically handled as one unit). This implies that either new cartridges (and thereby new guns) need to be developed, or it will still be necessary to have manual handling of modular propellant elements in the turret, something which naval guns moved away from several decades ago. The AS90 at present also has an air-cooled barrel, which means that although it can fire 10 rounds in the first minute, it can manage only 6 rpm for three minutes. BAe were presumably proposing to fit a new water-cooled barrel to achieve 18 rpm, which would account for the quoted weight of 29.5 tons (excluding magazine).

More recently BAe Systems changed tack and developed a new concept, the existing 4.5 inch Mk-8 naval mounting with the gun switched to the 155mm L/39 from the AS90 (surplus barrels being available). This was known as the 155 TMF (Third generation Maritime Fire support). The existing mounting is apparently strong enough to stand the additional weight and recoil (and could also accept the 155mm L/52 if required). The weight of the 155 TMF mounting went up from 22.5 tons (Mk-8 Mod 1) to 24.5 tons, although this is still lighter than the original 4.5 inch Mk-8 Mod 0 at 26.4 tons. Other modifications needed to the mounting include a double-stroke loading cycle to fire the separated ammunition (which would presumably halve the RoF to around 12 rpm) plus some adjustments to accommodate the wider ammunition. It appeared that the gun would use a single-module L10 artillery charge. Obvious advantages include commonality of gun and ammunition with the British Army (with a huge long-term saving in future ammunition development costs), 80% commonality with the existing Mk-8 Mod 1 mounting without requiring the "navalisation" of an army turret, and greater destructive power than the 5 inch gun with a longer range than even the new 4.5 inch Extended Range ammunition: 30 v. 27 km. There was clearly the potential for far greater range and effectiveness increases in the future using advanced

ammunition, including guided projectiles; for instance, Italy is planning a 155mm artillery version of the 5 inch Vulcano ammunition (see above). The RN was reportedly very keen on the 155 TMF project, resulting in the award of government development funding in 2007. The main problem to be solved was the handling of the propellant charges, which the RN requires to be encased for fire safety reasons. Sadly, this very promising and relatively low-cost project was a victim of the swingeing cuts in defence projects in 2010.

All of these developments are or were intended to improve the range and accuracy of gunfire support, moving the warships away from the risk of counterattack from land and/or allowing them to extend their fire support far inland. However, there is clearly the potential to develop different kinds of ammunition for other purposes. A destroyer armed with such a gun and homing ammunition, capable of engaging aircraft and possibly missiles as well as ships and shore targets, would have a powerful and versatile

back-up to its long-range missiles. A frigate so armed would arguably not need missiles at all.

Future generations of frigates might look very different, with a 155mm gun backed up by a CIWS such as the 30mm Goalkeeper or the new 35mm Oerlikon Millennium. Time will tell! ■

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# RETURN TO THE SEAS AN RFA FOR AUSTRALIA

By Robert Cuthbert Blake

**The notion of Australia returning to the sea to broaden its prosperity has a number of challenges as well as opportunities. One way that it can be enabled is through the bold concept of an Australian Naval Auxiliary Fleet of Merchant Mariners to ease the personnel burdens on the RAN and provide the people for the economic well being of the nation through enhanced trade on the sea.**

The Honourable Anthony Albanese MP in his bold article in *THE NAVY*, Vol 73, Oct-Dec 2011, 'Stronger Shipping for a Stronger Australia' provides a strategy for a future on the sea. He uses fine words but it will be up to us as Australians to find our way back to the global commons of the seas in ways that fit us as a people and emerging maritime power. Anthony Albanese ends by setting out his demands that Australia:

- Becomes a 'participant' in and of the seas, 'not just customers';
- 'Upgrades its Fleets' – presumed to include the Red, White and Blue;
- 'Creates a new regulatory framework' to enable this maritime future;
- Provides a 'best of class' financial and 'tax system' to sustain its 'shipping' base, and;
- Creates 'a pool of skilled seafarers to operate the ships of the future' across the oceans of our futures.

## PARTICIPANTS IN AND OF THE SEAS

The question needs also to be one of degrees and of taking the long view of Australia, of industry and its economy; not simply the shortened political horizon that has tended to dominate the narrative over the past three decades. Exactly where is Australia's co-adaptive advantage and how ecologically can this be realised? Realised in ways that will not simply create more global competition – for jobs, for careers, for lifestyles, for productivity, for food, for products, for economy, for financial services, for health, for energy, for climate, for security, for education and for safety – leading inevitably to hyper-competition. We live in unprecedented times of uncertainty and of change as the world transition potentially from one form of global governance to another yet to be defined. Only our grandparents have lived through similar times; during and following the Great Recession.

Some economic commentators are beginning to suggest – as the enormity of the collapse in Europe begins to tell – that there must be grave danger of the Great Recession ending similarly in war. This would be a bad thing for the world let alone all Australians. Yet the policies being followed, given the dysfunctional and broken nature of the three great economies and currencies – the US Dollar (no longer believing

in itself or acting as prime); the Chinese Dollar (devalued to a beggarly-neighbour tariff level) and the Euro (incapable of functioning, it would seem, other than at the whim of a democracy-lite, technocracy run from Brussels (Berlin and Paris)) – point increasingly toward more and more competition. Hence the suggestion for seeking co-adaptive advantage not competitive advantage; so as to avoid trying to put out the fire with gasoline! This is not some Luddite return to Mother Nature that Greens may call for or the banning of all technologies and sciences that other factions demand. It is a call for a proper return to our empirical senses and for Australia to begin re-finding and re-securing its futures based on principled (rather than referential) science and the connected technologies necessary to feed and clothe the world's population in the future. And this will require a degree of honesty that the political classes and Green lobbyists – noting the shenanigans related to climate change reporting – have yet to bring to the table.

Back to participating in and of the seas. How is this to be achieved? Anthony Albanese sets out some of the ways but, underneath these, must be a desire to create, build and educate a new group of Australians who will find their futures serving the seas. If we take a hard look at the Australian maritime industry of today we find that the opportunities are simply not there and the emphasis, such as it is, remains upon other industries. There are exceptions. Australia does build specialised aluminium shipping specifically used as fast ferry services in some of the wilder seas of the world and also by the USN in specialised littoral combat areas. These industries remain world-beating and look increasingly posed to enter other markets and navies, for example the Japanese. Australia also makes submarines which, as *THE NAVY* Magazine has previously attested, are actually much better than their reputation suggests. A classic case where the perception has become the reality; not the truth. Yet if we are honest with ourselves, beyond ship conversion; limited ship design; fitting out and the production of world-beating system technologies – for example CEAFAR and CEAMOUNT for which contracts were awarded in November 2011 to fit the Anzac class – Australia does not build or make commercial ships of significant scale. Certainly not the larger specialised shipping required for energy and mineral exploration and transport.

On the other hand, Australia still possesses some of the most competent and effective civil engineers with an ability to scale and compose large – and so create the type of infrastructure necessary to support a world class shipping industry. Australia also has a highly certified population base – given the access to higher education – but not necessarily a well matured technical and industrial population. This creates significant imbalances. It is industry and productivity that allows a population to pull itself up one generation to the next and enables wealth to trickle down through the generations. As seen in the UK, the collapse in its industrial base and the rise of a perfidious 'financial industry' has been coincident with

The Royal Fleet Auxiliary (RFA) WAVE KNIGHT. The skills required to support a naval fleet by ships such as WAVE KNIGHT do not necessarily need to be military. WAVE KNIGHT is crewed by 80 Merchant Mariners employed by the UK Ministry of Defence. The capability she provides gives the RN reach and sustainment for its operations around the world. (RN)





The RFA LARGS BAY looms large in the background at the wharf in Portsmouth, UK, as CMDR John Cowan RAN (left), CO-designate for HMAS CHOULES, received 'the keys' from the Chief Officer, CDR Shane Wood, RFA. LARGS BAY (now CHOULES) was one of the RFA's most versatile assets. She was crewed by approx 60 Merchant Mariners. (RAN)

a collapse in social mobility and a widening to Edwardian levels of the disparity between the wealthy few and average incomes. This is an unhealthy position to be in – let alone for democracies defined by the universal franchise of equableness and equability. The question, therefore, is 'how Australia returns to the seas and creates a new industry that will enable productivity and co-adaptive wealth generation across current and future generations?' This will not be overnight and will require careful thinking through and strategizing. One issue may predominate and that is how to sustain such

a maritime future and not to demarcate. In other words, how does Australia create a commercial maritime base that is capable of sustaining and maintaining its maritime security and vice versa? This article suggests that underpinning such a strategy must be a pragmatic and practical recombining of the Red and White Fleets wherever practicable in terms of their crews, ships and systems. And this returns to the need potentially for an auxiliary service (the Blue Fleet) to connect between and serve both Fleets. As per the Royal Fleet Auxiliary in the UK.

## UPGRADE ITS FLEETS

The Australian Fleets need upgrading and strategies were set for the RAN in the 2009 White Paper and, more recently, for the Red Fleet by Government. The RAN is growing at unprecedented levels which will demand more of its people and more people to complement it in the future. The RAN is transpiring rightly as a big-ship amphibious Service capable of projecting power and influence thousands of miles beyond the shore base; supported by an ocean going world-beating Submarine Service. These changes are occurring as we speak – and the projection of power from the LHDs should not be underestimated. As *THE NAVY Magazine* has suggested, once these ships take to the scene they will determine the strategic narrative and the questions will be 'where are they and why not?' As UAVs begin to take over the close air protection role from sea – potentially from as early as 2013 – the application of these ships with organic air support becomes more and more tenable. And these applications for future air capable platforms will undoubtedly determine and shape Fleet designs well into the next decade and beyond. These designs, it is argued, are coincident with increasing opportunities for the dual use of commercial hull types in military applications. Not by civilianisation of military kit or militarisation of civil hulls but the dual use of both. This plays directly into the strengths of the Australian maritime industry. Moreover, they

are at a scale and size that we can politically, militarily and economically afford to use them and, if necessary, lose them in pursuit of our security ambitions as a medium power. Put simply, if we cannot afford to politically, economically or militarily lose these assets; they will not be used.

The other scalar Australia needs to consider is the wider application of fast shipping – as recently and against its wishes, provided (again) to the RAN to examine. The Minister is right – this is an area where scale and hull type should be allowing Australia to modularise different systems to fit the ships; rather than expensively fitting the ships to task. And this is an area where Australia has huge co-adaptive advantage and the means and methods of providing the designs and skills necessary to support / convert such Fleets, at scale – and as an affordable export market.

The key aspect of both Fleets, described either in terms of scale (size) or scale (numbers), is that they are truly dual use. When not under the Red Ensign, they are being applied militarily and when not under the White they are paying their way under the Red Ensign. The connector between the two would, quite naturally, be the Blue Ensign Fleet of an Australian Auxiliary Force; this applies as much to the ships as to the crews. It should be possible that officers and crews serving under the Red Ensign could join the White and Blue Fleets and vice versa. If people want Command of warfaring systems as opposed to control of ships – then the opportunity should be available for them to pursue careers through the White Fleet and the RAN. If they wish to maintain their seafaring skills, then the opportunity to do so should be there in the Red and Blue Fleets. Each Fleet capable of co-adaptively sustaining and maintaining the other.

## CREATE A NEW REGULATORY FRAMEWORK

The framework that would work is one whereby the zero tax rate not only encouraged good behaviour but investment into Australia's maritime infrastructure over the medium and longer term. Certainly this is what is intended but their is recent evidence – for example the carbon tax – of government's renegeing on previous deals and introducing, at best, highly contentious and expensive taxation to suit their own private political needs; not those of the economy or its people. The combination one is looking for is between private investment; the Federal Bank of Australia and commercial enterprises wishing to arbitrage the best deals for their hi-value dollars. The enterprise in the UK was

Navigation at sea is not a purely naval matter and is a skill needed by the private sector too. (RAN)





Gun Camera footage of an RFA amphibious transport ship coming under attack by cannon fire from an Argentine fighter during the Falklands Conflict. The RFA can and does enter war zones as part of its mission to support the navy.

called Admiralty and combined, in 1694, the Bank of England with the City with Navy to bankroll and build the Royal Navy of Nelson and beyond. The combination remains viable – particularly for an Australian economy and dollar seen to be safe in troubled times and yet which, also, needs to maintain investment, production and growth opportunities. The combination, as Anthony Albanese recognises, needs to be of interest to the major shipping companies, many of whom are looking to reinvest / arbitrage full value and rebuild their shipping arms as the world emerges from recession. The issue and healthy tension that would appear to apply is that between finance; the shipping companies; the maritime industry and the Navy. There would appear to be just such an opportunity emerging in Australia – and potentially the UK (also deemed to be a safe haven in troubled times) – for re-investing in the maritime. A key question though is that of the product and what it should look like.

## **PROVIDES A 'BEST OF' CLASS FINANCIAL AND TAX SYSTEM TO SUSTAIN THE SHIPPING BASE**

Left to their own resources, most Naval Officers would not design or build the Navies beginning to emerge in this part of the 21st Century. For Australia, this is a big ship Amphibious – and therefore joint – Force supported and integrated with a viable, deep / blue water submarine flotilla capable of taking the battle to the enemy. This is a time of Evolution in Military Affairs or EMA, where evolution is not incremental (or spiral) but by step change. Quite simply, the challenge all Navies are facing is to remain viable and affordable in the face of deep recession – and still capable of projecting influence at range. Australia is a maritime nation. If it is to project influence it has to go 4000 nautical miles up threat to do so, and a further 4000 nm to sustain the type of effects it may wish to achieve. There is also a more local strategy that Australia may wish to influence with regard to the emerging US-Sino Containment policy. If one looks at the US decision to 'rotate' troops through Australia's northern bases and to

forward base from the Cocos Islands, then one can see an emerging containment policy based upon the islands of Diego Garcia (UK); Cocos (AUS) and Guam (US); shaped around the Malaccan straits, Singapore and the South China Seas. Again Singapore and the peninsular will form a central part in Australia's defensive alignment and those of the US. A question left unresolved, though, is how much Australia wants to act simply as a trip wire – as per West Germany during the Cold War – and how much Australia wishes to shape and influence its own defensive posture and destiny as an emerging Medium sized power?

An asymmetry was caused when the US emerged, post the Cold War, as the uni-super power. Events in New York, Washington, Iraq and Afghanistan – as well as Europe and China – are changing the shape and relationship of the US with the rest of the world. Tragically and worryingly democracies have been found wanting and it is probably true to reflect that a new Western democratic leadership model has yet to emerge. Nevertheless, as the wars in Iraq and Afghanistan wore on, it is Australia's relationship with the US that has emerged the stronger; not that of the UK – a UK that broke the cardinal rule of promising too much and delivering too little. The UK battered and, seemingly for the moment broken, appears to be retreating into itself. Its nonsensical strategic defence and security review and its withdrawal from maritime aviation – witness its decision to retire as a carrier force until 2020 – are rapidly taking it from the stage of world affairs. Particularly, a stage where the US looks and indeed requires partners of similar composition against which it can scale, fit and compose its own forces. For Australia, therefore, the strategic question is how best to scale and compose its force structures so that it can exert maximum influence with the US while projecting its own unique strengths and virtues either in Alliance or acting unilaterally. There is likely to be a time, in the not too distant future – as China's aircraft carrier tours the Southern Pacific on its first major flag-waiving deployment (akin to the impact of the US White Fleet on Australia at the turn of the last century) – when Australia will wish and indeed need sovereign deployability (in other words a Fleet) of its own. Beyond Afghanistan, no right thinking Australian politician will think of committing medium scaled land forces for enduring war-fighting operations in South West Asia or the Middle East for a generation or more. In which case, the most effective and efficient way for Australia to exert its influence will be from and by the sea.

This returns to the question of product which needs to be shaped by the co-adaptive advantages Australia can bring to bear. If we were at war – and there are those who believe we probably are but cannot yet articulate or name this war by class – then would we be persisting in building ships that take us decades to design and build? And building classes of ship in such small numbers that there can be little economy but all the costs of re-work necessitated by prolonged builds and featurism (to get the ships where they may want to be). The answer is of course that we would be doing things differently. We would be adapting the perfectly good and usable civilian platforms to meet naval needs. Since we do not build ships, we would be investing in the design, classification and conversion skills necessary to achieve what we want from the skills and ships available at affordable cost to us. And we would be creating in scale and numbers so that we can afford to take the losses. This is a different design and build criteria but plays into Australian industrial skills, maritime virtues and financial strengths. It is inherently dual use but it restores influence, credibility and reputation to the Australian maritime base. And dual use would need to extend to the way its people work and are employed as well as to its ships, platforms and operating bases. Fleet Base East is Garden Island and is Sydney. A Royal Australian Navy excluded through some political and financial chicanery from its historical base would be an absolute disaster. Dual Use should and must extend to maintaining a viable Naval Base in Sydney; operating and working alongside those of the merchant marine. It is a question of getting designs and strategies

aligned – not of excluding one in favour of the other.

To match the best in class financial and [depreciationary] tax system, Australia will also require a classification system to maintain its Red, White and Blue Fleets in class and afford them over the longer term. It is here that Australia could do well to use the strength of its Dollar to encourage the buying up of whole Fleets now at knock down prices. The trick will be creating a framework that brings together ship brokers and major shipping companies. The centre of the shipping industry remains to this day the UK and the City of London together with Lloyds Register. Major shipping companies are looking to break out of (disintegrate) the vertically integrated models imposed upon them and return to their maritime and shipping businesses. They are looking for opportunities to grow just as capital in both the UK and Australia is looking for safe opportunities to invest. Classification will be key – hence Lloyds Register. Ships brought either as a Fleet or as single purchases will need to be brought into class.

Classification is key to sustaining fleets over the longer term; minimising through life costs; enabling conversion to other purposes and providing common education and training structures. Classification underpins the opportunity for dual use and creating a class of naval vessels capable of being modularised for alternative applications. For example, as air deck platforms operating UAVs or turbo-prop and rotary wing aircraft or aluminium fast ships applying stand-off-systems for mine-hunting.

Working with the major shipping companies it is possible that crewing could similarly be provided in the short term. Longer term it is in the interests of Australia and the major shipping companies to grow and sustain its own seafaring base – and underpinning that base is the classification system. A classification system necessary to maintain levels of research and provide the education and training necessary to grow and sustain an Australian maritime industry at critical mass.

## CREATE A POOL OF SKILLED SEAFARERS TO OPERATE THE SHIPS OF THE FUTURE

The seas are a hard taskmaster – we should be under no illusions. Those of us who have served in the wild South Seas and those of the north know how challenging our trade can be. The trade takes us far from home and separates us in time and distance from the soft trappings and easy lifestyles enjoyed in contemporary Australia. We cannot avoid these trappings; nor the challenges they will bring in shaping the supply of skilled seafarers for tomorrow. We should also not ignore the mystery and adventure of a life spent at sea; of service and challenge throughout the oceans of the world. Just as major shipping companies are looking to invest in new ships and take back / on responsibilities for their own affairs, so they are also recognising the regulatory need to refresh and update their technical and manpower skills. Skills they see in short supply – particularly from the older traditional seafaring nations such as the UK and Australia. They recognise that part of the assurance they will need to satisfy in the future is in the quality of their seafarers and their ability to work within and comply to international and regional regulations. This is not a return to the Navigation Act but does touch upon issues of national integrity, of Flag and environmental sovereignty and energy and food security. For Australia, this also means building a Fleet that will enable its economy to grow on the back of any future US recovery and / or leverage from the continuing strength of the Chinese Dollar. In other words, an Australian Fleet has particular co-adaptive strategic advantage to Australia and allows it to invest resources from the extraction industries in a long term future maritime industry. At the same time, this will satisfy increasing calls by the Green lobby for improved surveillance and over-view of the maritime and shipping industries.

A Royal Australian Navy without a viable Merchant Marine will be left unbalanced; unable to occupy, project and sustain across the vast reaches of the Pacific Ocean. A Merchant Marine without an effective Royal Australian Navy will be left at the mercy of pirates and those nations unable or unwilling to adhere to UNCLOS. The two need to go hand in hand – and, just as there was an emerging third Fleet, the Blue, during the inter-war years – there is a similar need identified to revitalise an Auxiliary Fleet. Not to take from either the Red or White Fleets but to contribute and to connect to both. The war-fighting systems, crews and structures deployed on board should and must always continue to come from the Royal Australian Navy and the Australian Defence Forces. But there are other services of supply, ammunition and oiling that might equally well be provided by the Blue Fleet – working between the White and the Red. Finally, this structure sees a return of choice to the future seafarer. It provides seafarers with career opportunities to decide whether they want to pursue a career in the Merchant or Naval marines; or to occupy a role in-between as a reserve militia (in the Blue); or to choose a career entirely in one or to serve as a regular in one Fleet and a reserve in another. These are the type of healthy choices that we would wish our people to have. These choices would help to build on their aspirations as Australians whilst maintaining an agile workforce capable of adapting to future uncertainties and emerging challenges.

## ECONOMIES OF THE FUTURE

Australia has a real opportunity today to invest properly and over the longer term in its maritime industry (people, equipment, fleets and industry) and in so doing bootstrap its people and economy to a new and viable co-adaptive future. This will not be easy and will require thinking through and a coherent strategy if it is to be achieved. None of these virtues appear uppermost in the political entities, manifestos and politicians that govern today. A secure maritime industry will provide Australia with the type of assurances and security necessary to walk with confidence along the seaways of an uncertain future. It will enable Australia to do what it does well – to speak quietly and assuredly and to carry a big stick for those times when diplomacy fails. Australia is of the sea and will always be so. This is a future that will have benign effects on the Australian economy and, most importantly, its people – enabling future generations to go on realising the great Australian dream. It will also enable us to put back and take less in a future global environment of climate and security change – in which instability will be the only certainty. It has been said that a Fleet without a strategy is no Fleet at all. This could be extended to a nation wishing to build and secure a better future for the generations yet to come. And as we glance towards Europe and the US, Australia has the opportunity to do so much better – and to learn and adapt to others and its own failures to design and build its Red, White and Blue Fleets anew. ■

A Dutch warship escorts a cruise ship through pirate waters. The Merchant Marine and Navies need each other if either is to survive in the long term.







## 01 KEEL LAID FOR 1ST DDG-1000 DESTROYER

The USN laid the keel for its first Zumwalt-class destroyer (DDG-1000), on November 17, 2011 at General Dynamics-Bath Iron Works shipyard in Bath, Maine.

While keel laying was once traditionally the formal recognition of the start of the ship's construction, today's modular shipbuilding process allows fabrication of the ship to begin months before. However, the keel laying continues to symbolically recognise the joining of the ship's components and the ceremonial beginning of the ship.

"Keel laying is just the first of many important milestones and events in bringing ZUMWALT to life," said Capt. Jim Downey, DDG-1000 programme manager, Program Executive Office, Ships. "With the outstanding team we have assembled, I look forward to building on the superb progress we've achieved to date and delivering this extremely capable warship to the Fleet."

The lead ship and class are named in honour of former Chief of Naval Operations Adm. Elmo R. "Bud" Zumwalt Jr., who served as chief of naval operations from 1970-1974. The ship's co-sponsors, Ann Zumwalt, Mouzetta Zumwalt-Weathers, and Lt.Col. James G. Zumwalt symbolically authenticated the keel with a plate displaying the initials of all four children of the ship's namesake, including eldest son, the late-Elmo R. Zumwalt III.

Construction began on DDG-1000 in February 2009. ZUMWALT is currently more than 60% complete and scheduled to deliver in fiscal year 2014. Construction on the second ship of the class, MICHAEL MOONSOOR (DDG-1001), began in March 2010.

Designed for sustained operations in the littorals and land attack with its 155mm AGS, the multi-mission DDG-1000 will provide independent forward presence and deterrence, support special operations forces, and operate as an integral part of joint and combined expeditionary forces. This warship integrates numerous critical technologies, systems, and principles into a complete warfighting system. These include employment of optimal manning through human systems integration, improved quality of life, low operations and support costs, multi-spectral signature reduction, balanced warfighting design, survivability, and adaptability.

## ANZAC ASMD GO AHEAD

Minister for Defence Stephen Smith and Minister for Defence Materiel Jason Clare have announced that the Government has approved the upgrade of all eight of the Royal Australian Navy's Anzac class frigates with an advanced Anti-Ship Missile Defence system.

The total project cost is in excess of \$650 million, including the funds already spent upgrading HMAS PERTH.

The ANZAC class Anti-Ship Missile Defence (ASMD) project has also been removed from the Projects of Concern list.

The 2009 Defence White Paper outlined the Government's intent to put all of the Anzac class ships through an ASMD upgrade programme, subject to the successful outcome of at-sea trials on the first ship. The upgrade of HMAS PERTH as the lead ship for the ASMD programme was successfully completed earlier last year. Following exhaustive testing, including in the United States, the Chief of Navy agreed to the operational release of the system in July 2011.

Government has now approved the installation of the system on the remaining seven ships of the Anzac class by 2017.

At the moment the Anzac class frigates can engage one target at a time. The new system is able to identify, track and guide missiles to 17 targets at the same time.

Minister Clare said the project was a great Australian success story – cutting edge technology developed right here in Australia by CEA Technologies.

The remaining upgrade installation and integration work will be undertaken by the ANZAC Ship Integrated Materiel Support Programme Alliance, comprising SAAB Systems, BAE Systems and the Defence Materiel Organisation.

Minister Clare said that the ASMD upgrade programme is a good demonstration of how the Projects of Concern process can effectively manage difficult projects and deliver successful national security outcomes for Australia.

## 02 UK SELLS ALL GR-9s FOR US\$180M TO US

The UK has sold all remaining 72 retired Harrier GR-9 to the USMC in a deal worth about US\$180m (£116m), or about the price of one C-130J Hercules.

The Harriers, which were retired in 2010 as part of deep defence cuts, will be used as a source of spare parts for the US AV-8B Harrier fleet given expected delays in the introduction to service of the F-35B.

The UK Defence Minister Peter Luff said the sale was a good deal for UK taxpayers.

Harriers will be replaced by the Joint Strike Fighter by the decade's end.

**01** 'The keel' for the first Zumwalt-class destroyer (DDG-1000), being rolled out on November 17, 2011 at General Dynamics-Bath Iron Works shipyard in Bath, Maine.

**02** A sad sight. A fully capable UK GR-9 ground attack aircraft in storage at RAF Cottesmore in the UK. All 72 remaining GR-9, which were decommissioned at the end of 2010, have been sold for parts to the USMC for the price of one C-130J Hercules transport aircraft.





Mr Luff told the UK Parliament: "We have agreed the sale of the final 72 Harrier aircraft frames and associated parts which will be used as a major source of spares for the US Marine Corps Harrier AV-8B fleet of aircraft."

The deal represented "a good deal both for UK taxpayers and the US government," he said.

Mr Luff said that adding the savings made from retiring the Harrier fleet, their sale saved the UK about £1bn.

The British government retired its Harrier fleet as part of the strategic defence and security review (SDSR).

Critics say the decision to get rid of the Harriers along with the aircraft carrier ARK ROYAL leaves the UK without a carrier able to operate strike aircraft until 2020.

### 03 USN TO LOSE 12 SHIPS?

The US Navy is thought to be planning to retire nine Ticonderoga-class cruisers and three Whidbey Island-class dock landing ships (LSDs) in Fiscal Years 2013 (FY13) and 2014 as austerity measures hit the US Department of Defense (DoD).

According to the UK based *Jane's* Publisher the cruisers slated for decommissioning in FY13 are USS NORMANDY (CG-60), USS ANZIO (CG-68), USS VICKSBURG (CG-69) and USS CAPE ST GEORGE (CG-71), with USS PRINCETON (CG-59), USS COWPENS (CG-63), USS GETTYSBURG (CG-64), USS CHOSIN (CG-65) and USS HUE CITY (CG-66) following in FY14. The nine combatants entered service between 1989 and 1993.

The amphibious platforms scheduled for decommissioning were identified as USS WHIDBEY ISLAND (LSD-41), USS FORT MCHENRY (LSD-43) and USS TORTUGA (LSD-

46). The trio entered service between 1985 and 1990.

The potential losses cast doubt on the USN's ability to build up to its planned inventory of 313 ships and will also impact the National Maritime Strategy's target - agreed with the DoD - of a minimum of 33 amphibious vessels for the navy/marine corps amphibious assault concept.

The disclosure that 12 ships are to be decommissioned comes amid numerous reports of additional and wide-ranging fleet reductions under the new 2013 budget.

Interestingly none of the cruisers selected for retirement are thought to be equipped for ballistic missile defence (BMD) missions, which will be a primary focus of the US cruiser and destroyer force during the next five years as part of the Obama administration's European Phased Adaptive Approach for BMD. The US DoD recently announced it would forward deploy four BMD combatants to Rota, Spain.

### USN REVEALS NEW 'GREEN' SELF DEFENCE TEST SHIP

The USN has unveiled its new Self Defence Test Ship (SDTS). The SDTS concept involves a refurbished warship designed to support self-defence engineering, testing, and evaluation. The ship is unmanned and remotely controlled to avoid the safety constraints and other problems associated with manned ships and live fire tests. During typical operations a number of live airborne threats are launched at the ship. The combat and weapon systems being tested have to respond in order to defend the ship. The prearranged attack is in practice aimed at a decoy barge pulled 150 feet behind the SDTS in case of damage

The new SDTS is the decommissioned Spruance class destroyer PAUL F. FOSTER (former DD-

964). It was turned over for conversion on 27 March 2011 to the US Naval Surface Warfare Center Port Hueneme Division.

FOSTER has been outfitted with up-to-date weapons and sensor systems, most notably those found on US aircraft carriers and LHDs, and will play a significant role in the USN's future surface ship defence architecture.

The ship was already fitted with some systems and support elements needed for the newly installed equipment. This made for a faster and more cost effective conversion of what has been a very versatile platform for the USN during its life of type.

On visual inspection new systems fitted to the Spruance class destroyer include an SPS-48E 3D air search radar, an SPS-49 air search radar, SPQ-9B close range target search and accusation radar, two sea sparrow illuminators, a Mk-31 RAM launcher and Mk-15 Phalanx Block 1B. It is not known at this stage if FOSTER's 61 cell VLS has been reactivated for further missile tests.

PAUL F. FOSTER has replaced ex-USS DECATUR (DDG-31), which Port Hueneme Division acquired in 1994. The ship becomes part of a programme that in the past has proven its efficiency by providing the most realistic combat scenarios for test events, while leaving ships and their Sailors available to the fleet to perform their normal duties.

The current SDTS will continue testing operations through the end of fiscal year 2013.

As part of FOSTER's tenure as a test ship she has already successfully completed the largest shipboard biofuel test so far.

The ship was loaded with about 76,000 litres of a 50-50 blend of hydro-processed algal oil and conventional NATO F-76 fuel from the US Defense Fuel Supply Point at Naval Base Point

03 The Ticonderoga class cruiser USS VICKSBURG, seen here, is on the list of ships to be decommissioned to save costs. (RAN)

04 One down one to go. Two F-35B STOVL test aircraft have successfully completed two weeks at sea aboard the USN's LHD USS WASP. (USN)



Loma in San Diego on 16 November.

As a baseline run the ship sailed from Port Hueneme to San Diego on F-76 fuel. "Using the 50-50 blend on the return run to Port Hueneme, the tested engines were assessed on their ability to perform start sequences as well as the motoring and purging operations noted in Engineering Operational Sequencing System procedures," said Rick Kamin, leader of the Naval Fuels and Lubricants Cross Functional Team.

"We also collected data on compressor inlet temperature, engine speed, engine start time, fuel manifold pressure, turbine outlet temperature, turbine inlet temperature, ship service gas turbine generator power output and gas turbine main engine shaft output," he said.

While the SDTS has four LM 2500 main propulsion gas turbines and four 501-K17 ship-service gas turbine generators, the ship operated on only one LM 2500 and two 501-K17s during the overnight, 17-hour demonstration. All of the ship's propulsion power and 50 per cent of its service power came from the algal oil/F-76 fuel blend.

"From our perspective as the ship's operators there was absolutely no difference whatsoever in the operation or performance of the ship," said Mike Wolfe, the underway project officer for the Naval Surface Warfare Center's Port Hueneme Division. "The fuel burned just like the traditional fuel we get from the navy and have been burning for years. We could not tell the difference."

The test was a milestone in the navy's plans to deploy a 'Great Green Fleet' - a strike group of nuclear-powered vessels, hybrid-electric ships and other ships and aircraft powered by biofuels - by 2016. No changes were required to the infrastructure of the ship or the fuelling

pier for the SDTS test, which will be the only at-sea operational test of biofuels for the LM 2500, the engine found in most surface combatants, before the Green Strike Group sails its demonstration this year.

### OVERSEAS COMPANY TO PROVIDE UK'S NEXT FLEET TANKER

The UK Ministry of Defence (MoD) has entered the final round of bidding for its MARS (Military Afloat Reach and Sustainability) Tanker requirement. Three of the original six contenders remain in the bidding process; they are Daewoo Shipbuilding and Marine Engineering (South Korea), Fincantieri (Italy) and Hyundai Heavy Industries (South Korea) remain in contention.

A final down selection is anticipated by early this year.

Intended to replace the ageing Royal Fleet Auxiliary (RFA) Leaf and Rover-class single-hulled tankers in service, the MARS Tanker programme plans the acquisition of four double-hulled tankers to ensure compliance with International Maritime Organisation (IMO) regulations. The first vessel is due to enter RFA service in 2016.

The MARS Tanker requirement calls for a ship capable of carrying up to 19,000 m<sup>3</sup> of liquid cargo (Class III petroleum products), a range of 7,000nm at 15kt and a sustained speed of 15kt in Sea State 5. Other features will include three replenishment-at-sea stations and the ability to operate and maintain a Chinook-size helicopter.

### 04 F-35B BEGINS STOVL SEA TRIALS

Sea trials of the short take-off and vertical landing (STOVL)-variant of the Lockheed Martin F-35B Lightning II Joint Strike Fighter (JSF) have completed off the US east coast,

with the first landing of the test bed aircraft BF-2 aboard a USN warship on 3 October 2011.

The vertical landing aboard the amphibious assault vessel USS WASP (LHD-1) went "exactly like we predicted", US Marine Corps (USMC) test pilot Lieutenant Colonel Fred Schenk said afterwards.

As well as collecting data on the aircraft's ability to perform STOVL operations in a maritime environment, the two-week sea trials campaign examined how the F-35B integrated with the ship's landing systems, as well as testing deck and hangar operations. In preparation for these sea trials, USS WASP was fitted with specialist instrumentation to measure deck environmental effects.

In addition to being the first ship to successfully land the F-35B, USS WASP was also the first ship to host the V-22 Osprey during shipboard trials in October 2007.

The USMC is set to replace its current fleet of McDonnell Douglas AV-8B Harrier II and Boeing F/A-18 Hornet combat aircraft with the F-35B. Italy will also operate the aircraft and Spain has expressed an interest in doing the same. Both Italy and Spain currently operate Harriers from their aircraft carriers and the F-35B is the only aircraft that will allow them to retain a fixed-wing carrier capability.

### 05 LRLAP SUCCESS

The USN's 155mm Long Range Land Attack Projectile (LRLAP) has demonstrated its effectiveness against targets for the first time, Naval Sea Systems Command (NAVSEA) announced on 22 September.

Two test firings of the 155 mm munition were conducted at the White Sands Missile Range in New Mexico on 30 August, using an Advanced

05 A computer generated image of the USN's 155mm Long Range Land Attack Projectile (LRLAP) fired from the 155 mm (6.1 inch) AGS on a Zumwalt-class (DDG-1000) destroyer.





Gun System (AGS) gun barrel mounted on a modified M-110 howitzer. Both rounds flew 45nm and achieved all key objectives, including successful launch, GPS acquisition, terminal accuracy and warhead functionality, NAVSEA said.

The rocket-assisted guided projectile has been designed for use with the 155 mm (6.1 inch) AGS, which is being fitted in the navy's planned Zumwalt-class (DDG-1000) destroyers.

At 2.2 m long and weighing 230 lb (104 kg), the projectile incorporates an inertial navigation system, GPS receiver and retractable guidance (fore) and stabilising (aft) fins.

In conjunction with the BAE Systems-designed AGS, the LRLAP is designed to provide over-the-horizon precision fire support for marine and other forces ashore with minimal collateral damage, with an objective range of up to 74nm. A maximum sustained firing rate of 10 rds/min is anticipated, down from the 12 rds/min originally conceived. A two-gun configuration means that each Zumwalt-class destroyer will be able to mass 140-160 projectiles in the air simultaneously through different trajectories and charge settings.

In December 2010, BAE Systems received a US\$185.3 million contract modification to restructure the system development and demonstration effort for the LRLAP, with the main purpose being to reduce development risk by conducting more guided flight-tests in a near-tactical configuration. Work is expected to be completed by 2013.

## RAN LHD GETS SHARPEYE

Kelvin Hughes has developed a short-range helicopter control radar (SRHCR) using its innovative SharpEye technology for the RAN's new Canberra-class LHD.

A first SRHCR unit - featuring S-band solid-state transceiver and pulse Doppler processing in place of the conventional magnetron - was delivered to BAE Systems Australia for integration into the lead ship, CANBERRA, in late September 2010.

With IMO regulations prohibiting the use of navigation radars for helicopter control tasks, UK-based Kelvin Hughes developed the SharpEye SRHCR specifically for the two new LHDs under a 2010 contract, the company said.

As well as the solid-state transceiver, the SRHCR solution includes a 3.9 m low-profile antenna and tracking software developed in conjunction with QintetiQ to provide helicopter track data to the command system with no operator intervention.

The air traffic control room houses a Kelvin Hughes MantaDigital processor and display console connected by optical-fibre cables to a slave display in the operations room. The system can also be used as a standalone manned station, providing a back-up capability based on mission requirements.

## 06 DUTCH NAVY TO GO DOWN BMD PATH

The Dutch Ministry of Defence (MoD) has announced plans to upgrade the Thales Naval Nederland SMART-L long range surveillance radars on its ships in order to detect and track ballistic missiles. The Extended Long Range (ELR) mode will allow its destroyers to track targets up to 2,000km. The estimated cost for the Ballistic Missile Defence (BMD) upgrade is around 250M euro's (US\$334M).

The ELR upgrade is part of NATO's Active Layered Theatre Ballistic Missile Defence Upgrade and can also be utilised to augment the alliance's

Phased Adaptive Approach Programme to field land based Standard Missiles (SM-3) in Romania and Poland.

During the construction phase of the De Zeven Provinciën class destroyer programme, the Navy planned for the eventual addition of a BMD capability to the entire class. Since becoming operational, HMS TROMP has participated in BMD tests with the USN at the US Pacific Missile Test Range near Hawaii. Although the Dutch MoD does not acknowledge the procurement of SM-3, the De Zeven Provinciën class has the Lockheed Martin Mk-41 Vertical Launch System (VLS) that can house and launch the SM-3.

The Dutch Navy will no doubt procure the SM-3 individually or possibly as part of a common pool in the event other NATO countries such as Germany or Denmark move forward with BMD plans. The German F-124 frigates and the Danish patrol frigates also have the SMART-L and Mk-41 combination. The Dutch Navy could begin the SMART-L radar modifications as early as 2012 with the procurement of SM-3 by 2013.

## US JHSV PROGRAMME SLASHED

As of mid-October 2011, it appears that the US Navy (USN) will cut its total buy of Fortitude class Joint High Speed Vessels (JHSVs) to only ten units from a high of 21 units originally anticipated when the programme began. Based on this new number, the tenth unit could be ordered by 2013 with delivery in 2015.

The down scoping of the JHSV programme is based on a new version of the USN's 313 ship fleet force structure, which has been briefed to US Administration officials. This follows action earlier in 2011 that called for the transfer of the US Army's five units to USN control; although those units would still be designated

**06** The Dutch Frigate TROMP in Sydney Harbour. The class's SMART-L long range surveillance radars will be upgraded in order to detect and track ballistic missiles. (Chris Sattler)

**07** The Armidale class patrol boat HMAS BROOME. BROOME, successfully prevented an environmental and maritime catastrophe off Papua New Guinea late last year by providing assistance to a commercial container ship, which had lost power and was drifting towards Ragelapra Reef. (RAN)



to Army missions.

The transfer of the Army's JHSV units to the Navy earlier last year was the first indication of a possible reduction in the programme.

The new version of the 313-ship fleet will largely be based on anticipated budgetary cutbacks over the next ten years. The reduction of the JHSV is probably the first of many programme cancellations and down scoping that will begin in earnest in late November.

## 07 HMAS BROOME AVERTS MARITIME DISASTER

The men and women of the RAN Patrol Boat, HMAS BROOME, successfully prevented an environmental and maritime catastrophe off Papua New Guinea late last year by providing assistance to a commercial container ship, which had lost power and was drifting towards Ragelapra Reef.

At approximately 9.20am on 24 October, 2011, the Australian Maritime Safety Authority requested Defence support in aiding the container vessel *MV Vega Fyren*, which had lost engine power and was drifting towards a charted reef, 100 nautical miles south-east of Port Moresby.

Commanding Officer of HMAS BROOME Commander John Navin said his Ship's Company were in final preparations to berth at the PNG town of Alotau when the new orders were received.

"The crew took the change of task in their stride as our Patrol Boat turned away from port and increased speed," Commander Navin said.

"The rendering of assistance for the safety of life at sea is at the forefront of every mariner's ethos."

On receiving the call, HMAS BROOME sailed 146 nautical miles at best speed to rendezvous with the 13,000-ton *MV Vega Fyren* and made contact with its captain to offer assistance to his crew should they be required to evacuate their ship.

While on station, HMAS BROOME's command team confirmed *MV Vega Fyren's* drift rate and direction and worked to develop options to prevent the almost certain grounding on the reef.

Commander Navin said his team planned a stern-to-stern tow option in the hope they could at least arrest the drift of *MV Vega Fyren* until commercial salvage vessels and tugs arrived.

"The tow line was passed to the *MV Vega Fyren* only 700 metres before the ship entered uncharted waters as the sun was setting," Commander Navin said.

Despite the *MV Vega Fyren's* large size and tonnage, HMAS BROOME was able to arrest the northerly drift of the container vessel, and slowly pull it south and away from immediate danger.

The Armidale class Patrol Boat, dwarfed by the commercial carrier, kept the ship under tow for six hours until passing the tow line to a commercial tug, better suited for the role.

After successfully handing over the job, the Ship's Company of HMAS BROOME sailed back to Alotau to continue with their planned activities.

## 08 FALKLAND'S VETERAN GOES FOR SCRAP

The former RN destroyer HMS EXETER was towed from Portsmouth naval base on 22 September 2010 to her final destination, a scrap yard in Turkey, marking the end of a fine ship.

The Type 42 Batch 2 destroyer was built by Swan Hunter at Wallsend-on-Tyne and first commissioned on 19 September 1980. The ship sailed to the Falklands from the Caribbean to replace the lost HMS SHEFFIELD. During the conflict she shot down three Argentine aircraft, and quite possibly an Exocet missile on 30 May (although this was claimed by another ship). HMS EXETER also participated in Operation Granby during the 1991 Gulf War where part of her duties consisted of protecting American warships that were taking part in shore bombardments. HMS EXETER was the last RN warship to remain in service that actively served in the Falklands War. She was placed in Reserve in a state of extended readiness at Portsmouth on 30 July 2008 and finally decommissioned on 27 March 2009. She was sold by auction for scrap on 28 March 2011.

The only remaining ship that saw service during the Falklands War still in the Royal Navy is the former Type 82 destroyer HMS BRISTOL, which is employed as a static accommodation and training ship in Portsmouth harbour.

## RN AXES 1,000 JOBS

In an announcement by the UK Government on 30 September 2011, more than 1,000 sailors in the RN are to be made redundant as part of Britain's efforts to balance its military budget against a background of economic stagnation and sharp cutbacks in government spending.

They are the first part of cuts that will see 5,000 jobs lost from the Royal Navy by 2015, as Prime Minister David Cameron's coalition government, which came to power in 2010, struggles to keep its budgets under control.

A spokesman for the UK Ministry of Defence (MOD) said the cuts were "the next step after the 2010 announcement of the Strategic Defence

08 HMS EXETER during the Falkland's Conflict. As a Batch II Type 42 destroyer her better combat system allowed her to engage Argentine aircraft at wave top height, something the Argentines knew was a weakness of the Batch I ships deployed. (RN)





and Security Review (SDSR). It was announced then that there would be 5,000 redundancies in the RN, 7,000 in the army, and 5,000 within the Royal Air Force."

In addition, the UK MOD will also cut 32,000 civilian jobs, as part of a plan to save 5 billion pounds (about US\$7.8 billion).

A total of 1,020 jobs were cut on 30 September, 350 of them compulsory redundancies.

The then Defence Secretary Liam Fox said the military was partly to blame for the cuts because of its bad management of projects.

Fox said that the MOD and former military leaders had to accept responsibility for a "complete breakdown of trust" between the military and the British government.

He said that before the coalition government came to power in 2010, there had been "an almost complete breakdown between the MOD and the Treasury and the MOD and Number 10 (Downing Street)."

The reduction in the British military spending has been seen by some as a signal of Britain's declining status as a global power and the relative weakening of its economy in the wake of the global financial crisis.

The cuts are part of a wider plan to reduce military spending by up to 8% over the coming four years. So far the plan already included the scrapping of the navy's flagship, the aircraft carrier ARK ROYAL, along with the entire fixed-wing aircraft fleet that flew off it, leaving Britain with no aircraft carrier and no naval aircraft for the coming 10 years.

Lee Willett, head of the maritime studies programme at the London think-tank Royal United Services Institute, said in a TV interview on 30 September that the British navy was not big enough for all the tasks around the world,

and ships had to be taken from counter-piracy tasks and from home waters for the Libyan mission.

### CRITICAL ENGINEER SHORTAGE HITS RAN

It has been reported that the RAN has been forced to offer an unprecedented \$80,000 bonus to engineers on its submarines and Anzac class frigates to stop them being poached by cashed-up mining companies.

The move will lead to some non-officer submariners being paid up to \$177,000 a year, almost as much as an experienced submarine commander, in a move the navy privately concedes could cause tension in the ranks. The bonuses of between \$40,000 and \$80,000 will be paid over two years to 200 selected non-officer marine technicians "who possess key operator qualifications" in return for two years' service.

The shortage of engineers was believed to be threatening the ability of Australia's Collins class submarines and ANZAC class frigates to put to sea. A Department of Defence spokesperson said the bonus was aimed at easing critical workforce issues. In particular, the navy is anxious to stem an exodus of engineers, who are being offered big pay to work for mining companies wanting their technical skills as Australia undergoes a resources boom.

### 09 BELL HELICOPTERS ACQUIRED TO TRAIN RAN AIRCREW

Raytheon Australia has signed a contract worth \$AUS 26m to provide three Bell 429 helicopters to train junior RAN aircrew.

The contract includes service and maintenance. The helicopters will join 723 Squadron at Nowra and be used for training aircrew as an interim

step between Squirrel helicopters and the new MH-60R Sea Hawks or MRH-90 helicopters.

### DECOMMISSIONED TYPE 22S ARRIVE IN PORTSMOUTH

The first Type 22 Batch 3 frigate to be relocated from Plymouth to Portsmouth, the former HMS CHATHAM, arrived under tow on 23 September 2010 in Portsmouth Harbour. She took the place of the former Type 42 destroyer HMS EXETER that was towed out for scrap the previous day. Stripped of all useful equipment, the ship makes a sad sight. Her fate is uncertain but the rumours are that she and her sister ship ex-HMS CAMPBELTOWN are to be sunk as targets by the submarine HMS ASTUTE.

Her sister ship, CAMPBELTOWN arrived under tow two days later, but unlike CHATHAM still mounted her Sea Wolf missile launcher. The other two Type 22 Batch 3 frigates, CUMBERLAND and CORNWALL remain for the time being in Plymouth.

HMS CHATHAM (F-87) was the last of the four Type 22 Batch 3 frigates to be completed. She was built by Swan Hunter at Wallsend-on-Tyne and first commissioned on 4 May 1990. She was the escort ship for the Royal Yacht BRITANNIA during the hand-over of Hong Kong to China in 1997 and in March 2003 undertook shore bombardments on the Al-Faw peninsula in Iraq prior to the landing of Royal Marines. She was decommissioned on 9 February 2011.

HMS CAMPBELTOWN (F86) was the second of the group to enter service, first commissioning on 27 May 1989. She was built by Cammell Laird at Birkenhead and, despite being laid down over a year later than her Yarrow-built sister ship HMS CUMBERLAND, was commissioned 13 days earlier. HMS CAMPBELTOWN was decommissioned on 7 April 2011.

09 A Bell 429 helicopter as leased to the RAN to train junior RAN aircrew.



The ships had proven themselves to be extremely versatile and were kept in service long after much newer ships in later classes were sold off.

It was thought and hoped up until recently that Brazil would buy the four frigates.

### **RSS ARCHER COMMISSIONED**

Singaporean Minister for Defence Dr Ng Eng Hen officiated at a ceremony to mark the commissioning of the Republic of Singapore Navy's (RSN) first Archer-class submarine, RSS ARCHER, at Changi Naval Base on 3 December 2011. Speaking at the commissioning ceremony, Dr Ng highlighted that the RSN would continue to build up and modernise its maritime warfare capabilities to better safeguard Singapore's interest. "The strengthening of our submarine capability is in line with this overall development plan to allow the RSN to better exploit the underwater dimension in maritime operations," said Dr Ng. He added that, RSS ARCHER, as the first Archer-class submarine, significantly enhances the RSN's submarine capability and strengthens Singapore's ability to contribute to the peace and stability of the region.

The Archer-class submarines were acquired from the Royal Swedish Navy in 2005. RSS ARCHER was launched on 16 June 2009 in Karlskrona, Sweden. The first Archer-class submarine arrived in Singapore on 17 August 2011 and had successfully conducted various system verifications and sea trials in local conditions as part of its operationalisation process. With the enhanced capabilities and combat system such as the Air Independent Propulsion and advanced sonar systems, the Archer-class submarines will increase the RSN's operational readiness to better secure the seaward defence of Singapore.

## **10 F-35C AND EMALS DEMONSTRATE START OF NAVAL AVIATION'S NEXT CENTURY**

The USN demonstrated early integration of the future of naval aviation Nov. 18 2011, when it launched F-35C test aircraft CF-3 with its new electromagnetic aircraft launch system (EMALS).

Testing the F-35C on EMALS provided an early opportunity to evaluate technical risks and began the process to integrate the carrier variant Joint Strike Fighter with the future carrier fleet aircraft launching system.

"The test flight went well," said Navy test pilot Lt. Christopher Tabert. "It felt very similar to the steam test launches we did this summer in the F-35C. It was quite an honour for me to play a small part in our launch today."

During the northern summer, the F-35C test team completed more than 50 steam catapult launches to perform an initial structural survey and collected steam ingestion data. The steam ingestion data produced robust results, allowing a reduction in the number of test launches by four.

Along with the steam launch data, the EMALS launch testing also provided information for the United Kingdom's Ministry of Defence as the UK proceeds with including EMALS in the Queen Elizabeth-class aircraft carrier.

In the past 12 months, the EMALS team launched a T-45 Goshawk, an E-2D Advanced Hawkeye, a C-2A Greyhound and several F/A-18 aircraft with and without stores.

Both EMALS and the F-35C are currently in test and evaluation, and represent technological leaps from the USN's current fleet. EMALS is set to install on the future USS GERALD R. FORD (CVN-78).

The F-35C carrier variant of the Joint Strike Fighter is distinct from the F-35A and F-35B variants with its larger wing surfaces and reinforced landing gear to withstand catapult launches and deck landing impacts associated with the demanding aircraft carrier environment. Initial carrier trials for the F-35C are scheduled for 2013. The F-35C is undergoing test and evaluation at NAS Patuxent River and Joint Base McGuire-Dix-Lakehurst before delivery to the fleet.

EMALS is a complete carrier-based launch system designed for the future USS GERALD R. FORD (CVN-78) and all future CVN-78-class aircraft carriers. EMALS has six subsystems and will expand the operational capability of the Navy's future carriers by permitting higher sortie rates and reduced costs compared to legacy systems. CVN-78 is more than 30 percent complete, with some production EMALS components already delivered to the shipyard to maintain a 2015 delivery schedule. ■

**10** An F-35C test aircraft, CF-3, being launched with the new electromagnetic aircraft launch system (EMALS). (USN)



# BUILDING THE QUEEN ELIZABETH CLASS FOR THE ROYAL NAVY

By CDR David Hobbs, MBE RN (Retd)

**The RN is pinning its hopes and future on two new aircraft carriers it is building, QUEEN ELIZABETH and PRINCE OF WALES. They will be the largest warships ever built in the UK. Leading Naval Aviation writer David Hobbs takes a look the construction programme and the design of the carriers.**

The two new aircraft carriers of the Queen Elizabeth class are vital to the future of the Royal Navy and work on their construction and assembly is one of the largest and most complex engineering projects ever undertaken in the UK. Design work covering a range of aircraft carrier shapes and sizes took a decade before the contract for construction work was signed by the UK Government in July 2008 with the Aircraft Carrier Alliance, an industrial group comprising BAE Systems Surface Ships, Babcock Marine, Thales and the Ministry of Defence. The project brings together high technology and skilled work forces, both within the alliance and in literally hundreds of smaller contractors.

Early concepts were timid and avoided a firm decision between STOVL and 'conventional' strike fighters with tail-hooks that would require catapults and arrestor wires; effectively the F-35B or F-35C versions of the Joint Strike Fighter. With my fixed-wing background I always felt that the 'C' version was the better alternative, putting the cost of assisted take-off into the ship rather than individual aircraft

and offering a considerably better performance. Despite the obvious merits of opening the choice of fighter to the F/A-18 or even the Rafale, and allowing interoperability with US and French carriers the decision to procure the F-35C was not taken until October 2010, two years after work started on QUEEN ELIZABETH and too late to procure catapults and arrestor wires and incorporate them during her planned construction phase. At least the design concept recognised the value of volume and these ships will not be constricted by lack of space; a shortcoming in all previous British carriers.

## PREPARATIONS

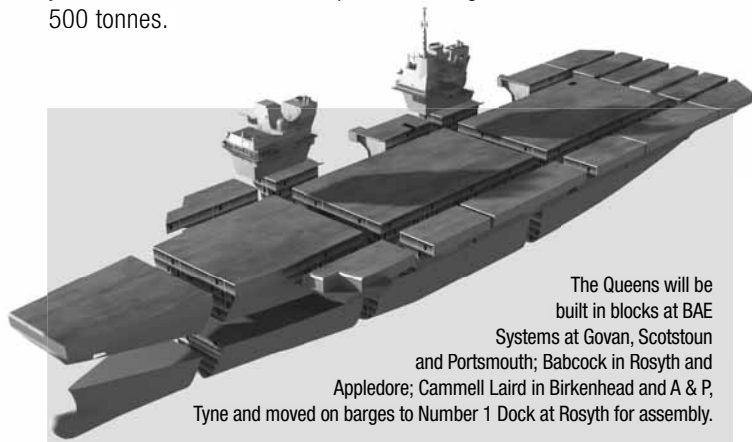
The ships are being built in sections constructed by BAE Systems at Govan, Scotstoun and Portsmouth; Babcock in Rosyth and Appledore; Cammell Laird in Birkenhead and A & P, Tyne and moved on barges to Number 1 Dock at Rosyth for assembly. Originally built in 1916, the dock is just large enough but needed to have the entrance widened

The redesigned Queen Elizabeth class without the ski jump and fitted with catapults and arrestor wires.





from 38 to 42 metres. The sides were re-profiled with the removal of angled steps to make the dock floor 9 metres wider. A new overhead crane with a span of 120 metres, named Goliath, has been installed to straddle the dock and lift the smaller blocks into place. It was built by Shanghai Zhenhua Port Machinery and delivered in 2011 when strengthening work to allow it to move on rails was completed. It is 68 metres high and visible for a considerable distance from the yard. Two hooks are each capable of lifting 1,000 tonnes and a third 500 tonnes.



The Queens will be built in blocks at BAE Systems at Govan, Scotstoun and Portsmouth; Babcock in Rosyth and Appledore; Cammell Laird in Birkenhead and A & P, Tyne and moved on barges to Number 1 Dock at Rosyth for assembly.

## DESIGN

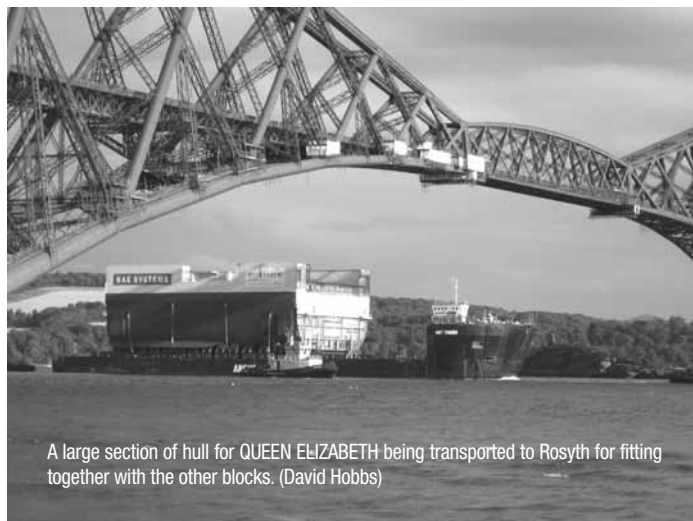
The evolving design process focused on the need for capability, adaptability and above all affordability. QUEEN ELIZABETH and PRINCE OF WALES are 'all-electric' ships, propelled by two 30 MW electric motors with power generation provided by two Rolls-Royce MT 30 gas turbines each delivering 36 MW; two auxiliary diesel generators each delivering 7 MW and a number of emergency diesel generators each capable of 2 MW. All will be mounted high in the ship in separate groups, reducing the need for large downtakes and exhausts to penetrate deep into the hull but requiring the separate islands with their exhaust 'stacks'. The two-island layout is unusual but not new to the RN; earlier British carrier designs in 1943 and 1951 had separate islands, with the latter incorporating exhausts from widely separated machinery but both were cancelled before construction began. CVA01, a later design also to have been named QUEEN ELIZABETH, would have been slightly longer but 10,000 tonnes lighter. Her long island had two widely separated exhaust incorporated within masts.

The individual blocks are built under cover and fitted out with machinery and sub-assemblies such as diesel generators, offices, cabins and galleys before they are moved to Rosyth. They have to fit each other precisely and a tolerance of only 10mm is allowed. Work started on the bow section for QUEEN ELIZABETH in December 2008 at Babcock's Appledore Shipyard; lower block 03 from Govan was delivered to Rosyth in August 2011; at just under 8,000 tonnes it had taken 2 years to build and fit out. Much of the current assembly work at the various yards is for PRINCE OF WALES. Each block forms a watertight section of the finished hull, enabling them to be floated into position before assembly, proving their build quality and integrity from the outset. Work was allocated to the different yards to provide, as far as possible, an even and predictable flow of work. The use of the latest cutting and welding technology has transformed the way in which the yards operate and the need to hire agency workers at peak periods together with trailers and barges to move the blocks imposes a strict discipline on completion dates, often years in advance, for every component. Thus far every aspect of the project has been completed on time at the predicted cost; the only variations have followed changes imposed by politicians.

The completed ships will be 284 metres long with a waterline beam of 39 metres and beam across the flight deck of 73 metres. Height from the bottom of the hull to the masthead will be 57 metres and draught 11 metres. There are 9 decks in the hull with another 9 in the islands. Each ship is expected to be in the dock for two years before being 'floated out' into the adjacent non-tidal basin for completion. Maximum speed is 25 knots with an economical speed of 15 knots giving an endurance of 10,000 nautical miles. They can sustain operations at maximum intensity for seven days without replenishment; have an upkeep interval of six months and need docking every six years. The ship's company of 679 compares very favourably with 726 in ILLUSTRIOUS and 4,660 including the air group in the new USN GERALD FORD (CVN21) class. An embarked air group or marine combat group will add about another 900 to this figure with space for austere accommodation beyond that. Four galleys with 67 catering staff serve four dining areas, the largest of which can serve 960 people with hot meals in an hour. Amenities include fitness suites, a cinema and shopping complex and all cabins will have access to e-mail and the internet. Junior sailors live in six-berth cabins allowing a flexible male/female mix within the ship's company and the majority of senior sailors and officers have single cabins with adjacent toilet and shower facilities. The sick bay includes an operating theatre, dental surgery and an eight bed ward with 11 full-time medical staff. This capability can be enhanced when the ship operates in the humanitarian role. Automation has been utilised extensively to minimise personnel numbers with ammunition, stores and catering supplies brought out of bulk stowage by systems similar to those used by the logistics industry ashore.

## AIRCRAFT

The class was designed to operate up to 36 F-35 joint strike fighters, referred to by the UK MOD as the Joint Combat Aircraft or JCA, to be embarked together with four airborne surveillance and control aircraft and four anti-submarine helicopters. Within the space and volume required for that most demanding task, the ships can support and operate a greater alternative range of UK and allied aircraft than any previous British aircraft carrier. From 2002 the planning assumption was that the STOVL, or F-35B variant of the JCA would be procured as a Harrier replacement and QUEEN ELIZABETH was to have been completed with a 12 degree ski-jump. The design was always capable of operating the F-35C 'tail-hook' variant designed to operate from USN aircraft carriers but the 2010 SDSR decision to procure the 'C' came too late to modify the first ship with catapults and



A large section of hull for QUEEN ELIZABETH being transported to Rosyth for fitting together with the other blocks. (David Hobbs)

arrester wires during build as she is too far advanced. She will, therefore, be completed without the ski-jump and operate helicopters after 'first of class' trials in 2018. The Alliance is working closely with the USN on the electro-magnetic aircraft launch system (EMALS) and advanced arrester gear being developed for the GERALD FORD class and these will be installed in PRINCE OF WALES during build for completion in 2018. She will have two EMALS, each 100 metres long and capable of launching an aircraft weighing up to 45,000 kg at up to 130 knots end speed every 45 seconds.

The airborne surveillance aircraft has not yet been selected but the 'funding assumption' is a Merlin helicopter fitted with the 'Cerberus' system taken from the present Sea King ASaC 7 which is due out of service in 2016. An attractive alternative is the E-2D Hawkeye which would give commonality with the USN and French navies with the potential for shared training and support. The large flight deck, hangar and associated side-lifts can accept any of the helicopters in UK service including Chinooks and Apaches in large numbers, both with their rotors spread. The two starboard-side lifts can each take two

F-35s or a single, spread Chinook.

The project was always intended to provide one ship at immediate readiness with the second at reduced readiness or in refit to give a 'gapless' UK capability. The decision to fit QUEEN ELIZABETH with catapults and arrester gear at her first refit after PRINCE OF WALES is operational will be taken at the next Defence Review in 2015. There is, at present, no maintenance and support contract for the fifty year lives of these ships but the Aircraft carrier Alliance is in talks on the subject with UK Government officials. ■



A computer generated image of the forward island superstructure as it will look like from the flight deck.



Block CB03d being fitted with LB03 courtesy of 'Goliath'.



An F-35C conducting catapult trials in the US. The carrier version of the JSF is thought to be cheaper to operate in the long run, and acquire, than the originally intended B variant with vertical landing capability. (USN)

A computer generated view of QUEEN ELIZABETH about to recover an F-35C on its flight deck.





# AUSTRALIA AND AEGIS BALLISTIC MISSILE DEFENCE PREPARING FOR THE INDO-PACIFIC CENTURY

By Captain George Galdorisi USN & Edward H. Feege

**THE NAVY's 2011 essay competition winner for the professional category was an essay on the unique opportunity the RAN has in its soon to be introduced Hobart class destroyers for anti-ballistic missile defence. This is an area the ADF needs to start investing in given the proliferation of ballistic missiles around the world.**

As the only country comprising a continent surrounded by water, Australians recognise that the 21st Century represents a decided shift "from Mackinder to Mahan." Said another way, perhaps the most profound difference between the 20th and 21st centuries is this: Europe is a landscape, East Asia is a seascape. The nexus of world power is shifting dramatically to the Asia-Pacific region and Indo-Pacific Ocean. As the only country-continent fronting both the Indian and Pacific Oceans, Australia is a critically important player in this region.

And because the Indo-Pacific oceans and the global commons are vitally important to Australia's security and prosperity, one of the most prominent and visible ways this forward thinking is being manifested is in the substantial expansion of the Royal Australian Navy (RAN), which is undertaking a building programme not witnessed in generations. But for a country of less than 30 million inhabitants and one confronting increasingly scarce resources, changes in national spending priorities must be done carefully and only after important policy documents such as *Defending Australia in the Asia Pacific Century: Force 2030* are issued, analysed, fully understood and embraced.

As Australian naval analysts Jack McCaffrie and Chris Rahman pointed out 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.<sup>1</sup> But now that the broad outlines of the new ships, aircraft, and major systems the RAN plans to buy have come sharply into focus, the difficult work begins. Canberra and the RAN must make many decisions over the next decade as to what "kit" – that is, the systems, subsystems, components and capabilities – the RAN acquires to make these enormously expensive platforms as capable as they possibly can be.

Given how capital-intensive all navies are, these investments will dictate the RAN's relevance as a fighting force for decades to come. And in a maritime century, for a maritime and seafaring nation, it is no overstatement to say that such decisions are some of the most important ones *Australia* will make in the next decade.

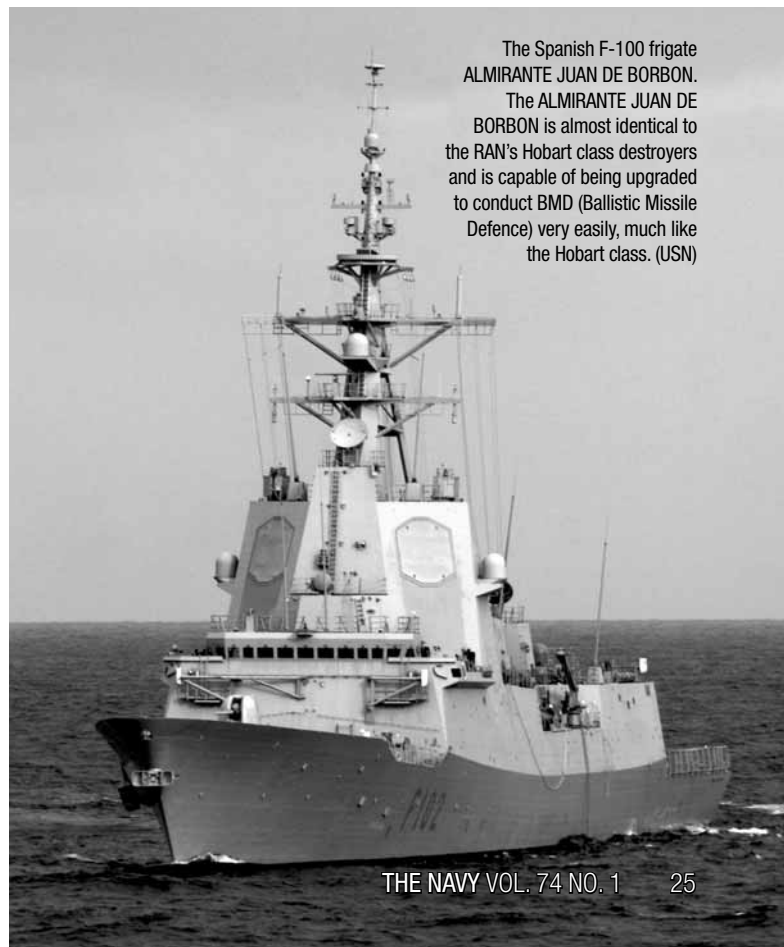
Given the dangerous neighbourhood Australia finds herself in this century, especially with regional nations armed with ballistic missiles and weapons of mass destruction (WMD), one of those systems Australia and the RAN may want to strongly consider is Aegis ballistic missile defence (BMD), a system being embraced by a growing number of first-rate navies. Moreover, these nations are increasingly operating in an Aegis global alliance and would surely embrace Australia as a valued partner in this important enterprise.

## AUSTRALIA'S REGIONAL THREATS AND CHALLENGES

No state can reliably and confidently treat vast ocean expanses as buffers that ensure its security and prosperity and isolate it from events beyond its shores. This is precisely why Australia is not building, to borrow an American term, a "goal-line defence" navy to deal only with threats as they approach the Australian continent. Rather, the nation and the RAN are building an ocean-going, blue-water, navy designed to be deployed and engaged far from the Australia's shores and one able to work with allies and partners to secure a global commons that is increasingly threatened.

The Royal Australian Navy has been prominent in teaming with regional and global partners in a wide range of maritime endeavours. *Defending Australia in the Asia Pacific Century: Force 2030* puts it this way:

"Australia's defence policy...entails the maintenance of alliances and international defence relationships that enhance our own security and allow us to work with others when we need to pool our resources..."



The Spanish F-100 frigate ALMIRANTE JUAN DE BORBON. The ALMIRANTE JUAN DE BORBON is almost identical to the RAN's Hobart class destroyers and is capable of being upgraded to conduct BMD (Ballistic Missile Defence) very easily, much like the Hobart class. (USN)



An anti-ballistic missile SM-3 being launched from the USS LAKE ERIE. Of all the anti-ballistic missile weapons being developed the SM-3 is the most successful and ready system. The RAN's Hobart class destroyers can employ SM-3 for BMD. (USN)

this defence policy means that we must have the capacity to lead military coalitions when we have shared strategic interests at stake with others... and make tailored contributions to military coalitions when we share wider strategic interests with others.<sup>2</sup>

While naval coalitions go back more than two millennia, the need for naval collaboration has never been greater. This is because threats in the Indo-Pacific region are perhaps more diverse than before and range from threats posed by emerging regional hegemon flexing their new muscles, to rogue states with increasingly assertive militaries, to transnational threats like piracy, smuggling of illicit substances and/or people, to resource conflicts, to terrorism.

Australia and the RAN have been prominent in addressing threats and challenges as part of regional and global partnerships. And increasingly, threats to Australia and others on the global commons include ballistic missiles, some which might be armed with weapons of mass destruction. These threats are real and confront Australia – as well as many of its regional neighbours – with a growing threat that must be confronted head-on. But how big is this threat, and is it “real” for Australia?

## BALLISTIC MISSILE DEFENCE IN THE INDO-PACIFIC REGION

The need for effective BMD has increased in the 21st Century. In 2012, more than 30 countries have deployed ballistic missiles, compared with only nine in 1972. Nations with hostile intentions toward their

neighbours in the Indo-Pacific region possess ballistic missiles and weapons of mass destruction, and today's rogue leaders view WMD as weapons of choice, not of last resort. Recent ballistic missile launches, especially in the short- to intermediate-range category, were particularly pronounced in the People's Republic of China, North Korea and Iran

The broadened ballistic missile threat, moreover, crosses strategic-, operational-, and tactical-level boundaries. For example, North Korea possesses a growing ballistic missile force that includes the short-range Scud C, medium-range No Dong and intermediate-range Taepo Dong 1 missiles, some of which might have been transferred to other countries. South Korean defence minister Kim Kwan-Jin told his country's parliament in June 2011 that North Korea may have already developed nuclear warheads small enough for ballistic missile payloads.

The actual pace of North Korean intercontinental-range weapon development is still the subject of debate, at least in open sources. There is no doubt, however, that



Two Chinese mobile DF-21 Intermediate Range Ballistic Missile launchers. The DF-21 has been modified by the Chinese with a radar seeker and control fins to attack ships far out to sea from China's mainland. This is the first guided anti-ship ballistic missile and presents the problem of high angle (coming from almost above) and high speed. Only BMD fitted ships will be able to defend against it.

the ballistic missile threat at the regional or theatre level is burgeoning. As is the case with the inter-continental ballistic missiles it aims to develop, North Korea undoubtedly intends to create “strategic” effects with short- to intermediate-range weapons in its own neighbourhood.

North Korea is not alone in leveraging this aspect of potential ballistic missile employment. China also is crafting an anti-access/area-denial strategy for the Western Pacific based in part on the operational-level use of ballistic missiles. China seeks the capacity to find U.S. aircraft carriers roughly a thousand miles from the mainland and attack them with homing anti-ship ballistic missiles. The most prominent aspect of this threat is China's development of the world's first anti-ship “carrier killer” ballistic missile, the DF-

21D, called the ultimate carrier-killer missile. And, clearly, missiles such as the DF-21D could target and possibly destroy Australia's new, big-deck amphibious ships and other large warships.

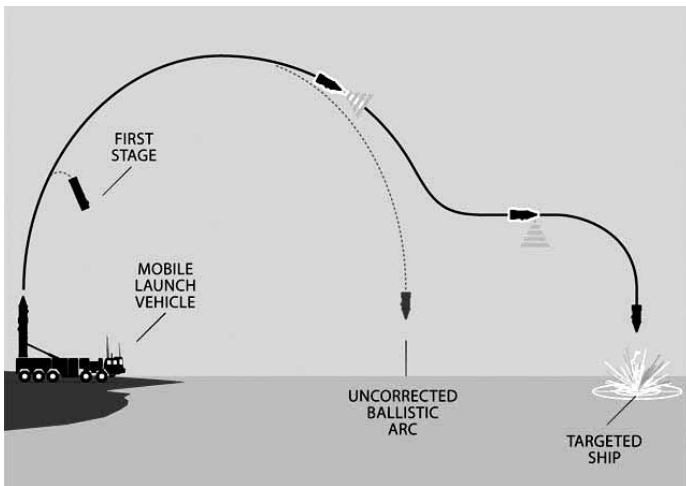
Some would downplay the threat posed by China and the DF-21D missile. However, what some observers miss is the fact that China need only make the cost of intervening to counter China's bullying of its smaller neighbours in disputes over the South China Sea so high that intervention is no longer a reasonable deterrent option. Moreover, China could export the DF-21D to other countries. Given the marginal success of ongoing non-proliferation efforts, the DF-21D could find its way to other governments with animus toward Australia and its friends and allies.

## HOW AUSTRALIA AND THE RAN ARE ADDRESSING THESE THREATS

Absent state-on-state conflict between Australia and its regional neighbours armed with long-range WMD-capable ballistic missiles, one could argue that the BMD threat to Australia is remote. While this is correct – for the moment – given Australia's wide range of friends and allies in the region and the RAN's participation in numerous regional naval exercises and patrols to address threats to the global commons, the RAN is rightfully concerned with the threat of both cruise and ballistic missiles to its naval forces.

The process to address these missile threats has already begun. Australia's decision to purchase the *Hobart*-class Air Warfare Destroyer (AWD) equipped with the U.S. Navy Aegis weapon system directly addresses the aircraft and cruise missile threat to naval forces. (Three are now under construction in early 2012.) As Air Vice-Marshal Osley, Australian Defence Attaché and Head of the Australian Defence Staff Washington, noted in a recent interview for an American defence journal, “The air warfare destroyers will deliver to the navy a significantly enhanced air defence capability primarily through the acquisition of the U.S. Aegis missile and weapons control systems that will be installed in each of the air warfare destroyers.”<sup>3</sup>

The RAN's wisdom in deciding to acquire these Aegis *Hobart*-class destroyers is clear. Some of Australia's most important regional partners already possess Aegis-capable ships. The Japanese Maritime Self-Defense Force (JMSDF) was the first foreign navy to construct Aegis warships. The JMSDF in early 2012 operates four *Kongo*-class destroyers; the lead ship of the class was commissioned in 1993. In 2000, the JMSDF won approval for two improved units, known as the *Atago*



A typical engagement schematic of the DF-21's attack profile. What's missing is the intelligence and surveillance effort required to locate a ship target in the first place.

class; the lead ship of that class was commissioned in 2007. Across the Sea of Japan, South Korea has announced plans to build six 5,600-ton KDX-III Aegis-equipped destroyers beginning in 2019 to complement the three *Sejon-Daewan* KDX-III Aegis destroyers that will be in service by 2012.

Thus, the three regional partners— Australia, Japan, and Korea — will field 18 Aegis ships by the end of the decade. Add the Aegis cruisers and destroyers the U.S. Navy has forward-deployed to Japan, to say nothing of other USN Aegis ships in the Western Pacific on various routine and not-so-routine missions, and these *Hobart*-class destroyers will enable Australia to weave the RAN into an expanding “Aegis Global Enterprise.”

Of course this Aegis Global Enterprise is not restricted to the Indo-Pacific region. The Aegis weapon system is also becoming a weapon of choice for other navies. The Spanish navy in early 2012 operated four Aegis-equipped *Alvaro de Bazan* (F100)-class air-defence frigates — the progenitor of the *Hobart*-class warships — with another under construction. Spain's interest in Aegis and its shipbuilding expertise also have migrated to the Norwegian navy. In 2011, the Royal Norwegian Navy received the last of five frigates of the *Fridtjof Nansen* (F310) class built by Navantia shipyard in Ferrol, Spain.

But while Australia's participation in this Aegis Global Enterprise will place it firmly in the ranks of first-class world navies and will help it partner with its allies and likely coalition partners at sea, and Aegis ably-equips these navies to deal with the worldwide proliferation of air-breathing cruise missiles, Aegis alone will not address the threat of anti-ship ballistic missiles. For that more is needed.

## AEGIS BMD AND THE ROYAL AUSTRALIAN NAVY'S FUTURE

The AWD will be a highly capable ship. According to *Defending Australia in the Asia Pacific Century: Force 2030*:

*“The Government will proceed with the acquisition of three Air Warfare Destroyers (AWD). In order to enhance the air defence capabilities of the AWDs, the Government will equip them with the Standard Missile-6 (SM-6) long-range anti-aircraft missile. The SM-6 missile is the most advanced weapon of its type, with a range of more than 200 nautical miles (370 kilometres) and effectively extends the air defence protection offered by these advanced ships. As they enter service, the AWDs will be equipped with a sophisticated Cooperative Engagement Capability (CEC), which enable each vessel to act as part of a wider “grid” of sensor and weapon platforms that can share surveillance and targeting information.”*<sup>4</sup>

Clearly, the robustness of the planned AWD would make a BMD capability a natural transformational upgrade.

But while it extols the *planned* capabilities of the AWD, *Defending Australia in the Asia Pacific Century* does not address the possibility to equip these ships with BMD capability. But should the RAN consider adding a BMD capability to its Aegis-configured *Hobart* class destroyers? Clearly this was something naval planners were considering when they contracted to have these ships “plumbed” for BMD, that is, should the RAN decide later to add BMD capability, it will be a relatively straightforward installation.

Certainly, such an addition has significant costs associated with it. But in spite of the significant costs associated with making the *Hobart*-class destroyers BMD-capable, the weight of available evidence suggests the RAN should strongly consider doing so — perhaps as early as when the three AWDs are placed in service. To do so would signal the RAN's commitment to field a navy that is clearly poised to take a more prominent leadership role in the Indo-Pacific region. Acquiring this capability could open the door to enhancing Australia's leadership of regional and even global maritime partnerships in the area of “high-end” warfare, specifically, defence against ballistic missiles armed with WMD.

This would be a propitious time to make a decision on acquiring this BMD capability. As Australia moves forward to make the RAN a world-class navy, the potential for the RAN to be involved in “high-end” warfare in the future, either solely or as part of global or regional partnerships increases. Accordingly, as the RAN looks ahead, one aspect of “high-end” warfare, dealing with ballistic missiles armed with WMDs represents a crucial aspect of the RAN's capability and capacity.

This is consistent with Australia's strategic worldview, as articulated in Defence White Paper:

*“There is no greater responsibility for a national government than the defence of the nation, its people and their interests. Australia has an enduring strategic interest in the stability of the wider Asia-Pacific region, which stretches from North Asia to the Eastern Indian Ocean.”*

Air Vice-Marshal Kym Osley explained:

*“Australia is really a middle power; one that considers itself as part of the broader world community, and who certainly sees itself as very relevant on the world stage.”*<sup>5</sup>

The capability of the Aegis weapon system to be the shield of a Global Maritime Partnership fleet and defend against manned and unmanned aircraft and cruise missiles has spawned an Aegis Global Enterprise through which increasing numbers of navies are embracing the Aegis solution. Now, however, the success of Aegis ballistic missile defence—22 successful test intercepts in 27 tries since January 2002—has resulted in several navies embracing as well the BMD component of Aegis. U.S. President Barack Obama's Phased Adaptive Approach, announced in September 2009, to protect Europe from the threat of ballistic missiles armed



An Iranian Zelzal 2 ballistic missile. Iran and North Korea are thought to be the biggest exporter of technology on ballistic missiles to those countries who count themselves as anti-Western.

The Japanese Aegis destroyer KONGO arriving in Pearl Harbor. KONGO became the first international ship to be retro-fitted for the BMD role. (USN)



with WMDs is but one manifestation of the growing global reliance on Aegis BMD. Indeed, one of the major decisions reached at NATO's November 2010 Lisbon summit was a firm requirement for collective defence against ballistic missiles.

Moreover, Europe is now looking to the Western Pacific and East Asia as an example of how navies can work together at sea in an Aegis BMD Global Enterprise. Currently this Aegis BMD enterprise includes the United States and Japan, with Japan's recent defence white paper reconfirming its commitment to equip all six of its Aegis destroyers with BMD-capability. High-level discussions have taken place to provide South Korea an Aegis BMD capability on their KDX-III class ships. Were Australia to make a commitment to Aegis BMD, the ability of this four-way maritime alliance to defeat ballistic missiles at sea would provide a strong deterrent to nations with hostile intentions on the global commons.

This outline of a potential multinational effort to defend against the growing ballistic missile threat is nowhere more evident than in the aforementioned Aegis BMD test programme. Aegis BMD's flight test programme has engaged allied participation both in missile tracking

and interceptor launches. In Europe, the Netherlands' LCF TROMP (F 803) was the first European flight test mission (FTM) participant. The ship's modified SMART-L/APAR tracked the ballistic missile target during the December 2006 FTM-11. The Spanish Navy's MENDEZ NUNEZ (F 104), outfitted with BMD software, tracked a ballistic missile target in the June 2007 FTM-12. But it is in East Asia where this determination is most prominent.

The JMSDF has progressed furthest in Aegis BMD testing, closely integrating its activities with its American counterparts. The destroyer KIRISHIMA was the first foreign warship to participate in a US Aegis BMD flight test in the June 2006 FTM-10. In December 2007, during the JMSDF's first flight-test mission, designated Japan JFTM-1, the KONGO became the first ship of an allied navy to engage successfully a ballistic missile target. Between 2007 and 2010, four separate JMSDF ships launched SM-3 missiles at medium-range

separating-warhead targets. These tests also demonstrated the promise of a broad-based coalition enterprise linking several navies' Aegis capabilities to address shared operational requirements.

## LEADER OF THE PAC?

Australia and the RAN can be justifiably proud of the important national commitment to a first-class regional and global navy. And, as Australia moves forward to capitalize on this substantial investment, becoming part of the growing Aegis BMD Global Enterprise should loom large in the government's deliberations. Aegis BMD is making the Global Maritime Partnership girded for high-end warfare a reality today. Should Australia elect to add this significant capability to its fleet, it would quickly become one of the most important partners in the Aegis BMD Global Enterprise and in so doing further serve to achieve the goals of the Defence White Paper. ■



The Spanish F-100 Aegis frigate ALMIRANTE JUAN DE BORBON in company with a USN aircraft carrier. RAN ships with a BMD capability can not only use it to defend themselves against new threats such as the Chinese DF-21 but also the ships they're escorting. Which makes them far more useful in the collation warfare role. (USN)

- 1 Jack McCaffrie and Chris Rahman, "Australia's 2009 Defence White Paper: A Maritime Force for Uncertain Times," U.S. Naval War College Review, Winter 2010, pp. 73-74.
- 2 Australian Defence Force, *Defending Australia in the Asia Pacific Century: Force 2030*, Australian Department of Defence, Canberra, 2009, [www.defence.gov.au](http://www.defence.gov.au), p. 18.
- 3 See John Gresham and Susan Kerr, "Interview: Air Vice-Marshal Kym Osley, AM, CSC, Australian Defence Attaché and Head of Australian Defence Staff Washington," *The Year In Defense 2010* (Tampa, FL, Faircount Media, 2010), p. 32.
- 4 *Defending Australia in the Asia Pacific Century: Force 2030*, p. 54.
- 5 "Interview: Air Vice-Marshal Kym Osley, AM, CSC, Australian Defence Attaché and Head of Australian Defence Staff Washington," p. 33.

# MATCH: HMAS CHOULES COMMISSIONED

The former Royal Fleet Auxiliary (RFA) LARGS BAY has been commissioned into the RAN as HMAS CHOULES after her refit and voyage from the UK. She was commissioned on 13 December 2011 at Fremantle in Western Australia.

The name CHOULES is in honour of Mr Claude Choules, the last known naval veteran to have served on active service in the First World War. He served in both the Royal Navy during the First World War and the Royal Australian Navy in the Second World War. He represented the last living link with those who had served in the First World War.

Mr Choules passed away in Perth, Western Australia, on 5 May in 2010 at the age of 110.

The Prime Minister, Julia Gillard, said that the naming of HMAS CHOULES recognised the service of a loyal and dedicated man in two different Navies over 40 years.

The name also signifies the link between the RN and RAN.

HMAS CHOULES is a Landing Ship Dock and was commissioned into service in the RFA 2006.

It became surplus to United Kingdom requirements as a result of the UK Government's 2010 Defence Strategic Review.

The ship weighs 16,000 tonnes, is 176 metres long and 26 metres wide. Its flight deck has room for a Chinook helicopter and a large temporary hangar has been fitted to house one helicopter. The ship can carry around

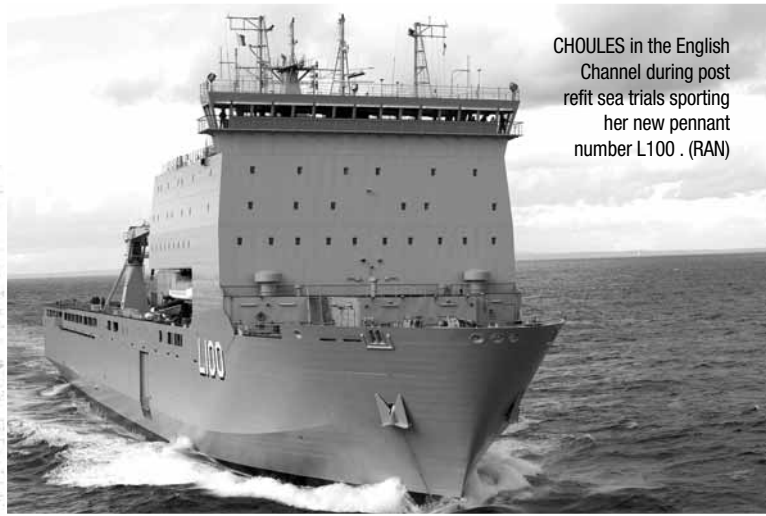
38 main battle tanks and/or many more lighter vehicles and 350 troops. It has a floodable stern dock for one LMC-8 sized landing craft.

Her crew size is approx 60 but this is in her RFA configuration and is a cruising capability only. Another 60 are required when embarking an army complement with vehicles and equipment.

She ship can carry two large Mexeflote pontoon style landing craft on either beam out of the water against the side of the ship.

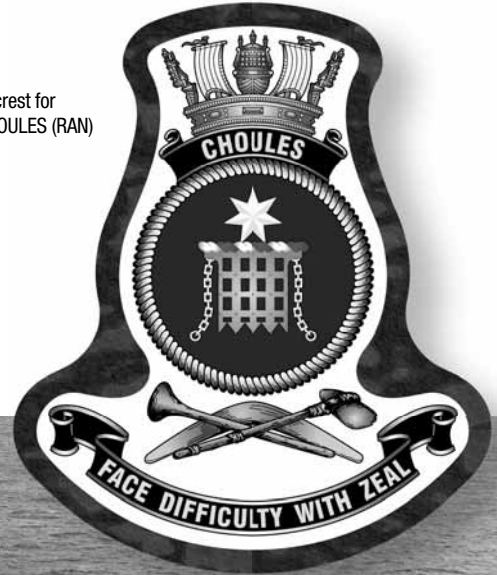
HMAS CHOULES is a proven capability having provided humanitarian relief as part of the international response to the Haiti earthquake in 2010. Other ships of the class have also served as mine countermeasures HQ and support platforms for smaller ships in the Persian Gulf

The ship was acquired for £65 million (approximately AU\$100 million) and will prove to be the jewel in the crown of the RAN until the arrival of the two Canberra class LHDs.



CHOULES in the English Channel during post refit sea trials sporting her new pennant number L100. (RAN)

The new crest for HMAS CHOULES (RAN)



The newest ship in the RAN, HMAS CHOULES. Note the large landing pad for helicopters and/or storage of vehicles. A new semi-permanent hangar has been fitted aft of the superstructure for a helicopter. (RAN)

# DISPATCH: HMAS KANIMBLA FARWELLED

The last of the Royal Australian Navy's Amphibious Landing Platforms, HMAS KANIMBLA, was decommissioned at her homeport of Garden Island, in Sydney, on 25 November 2011.

KANIMBLA's dedicated service was acknowledged in a traditional ceremony attended by the Chief of Navy, Vice Admiral Ray Griggs, AM, CSC, RAN and past and present crew.

During the ceremony the Australian White Ensign was lowered for the last time and handed to the Commanding Officer, Commander Brendon Zilko, RAN.

"Today represents the closing of a fine chapter in the history of Navy's Amphibious Fleet," Commander Zilko said.

"HMAS KANIMBLA has provided outstanding service and dedication to duty over her 17 years, actively supporting National and coalition operations spanning from the Western Pacific to the Middle East."

"KANIMBLA was the first Coalition vessel to supply urgently needed medical supplies to civilian hospitals in Baghdad."

"KANIMBLA also undertook numerous humanitarian aid and disaster relief missions providing relief to thousands of people in Vanuatu, Indonesia

and East Timor."

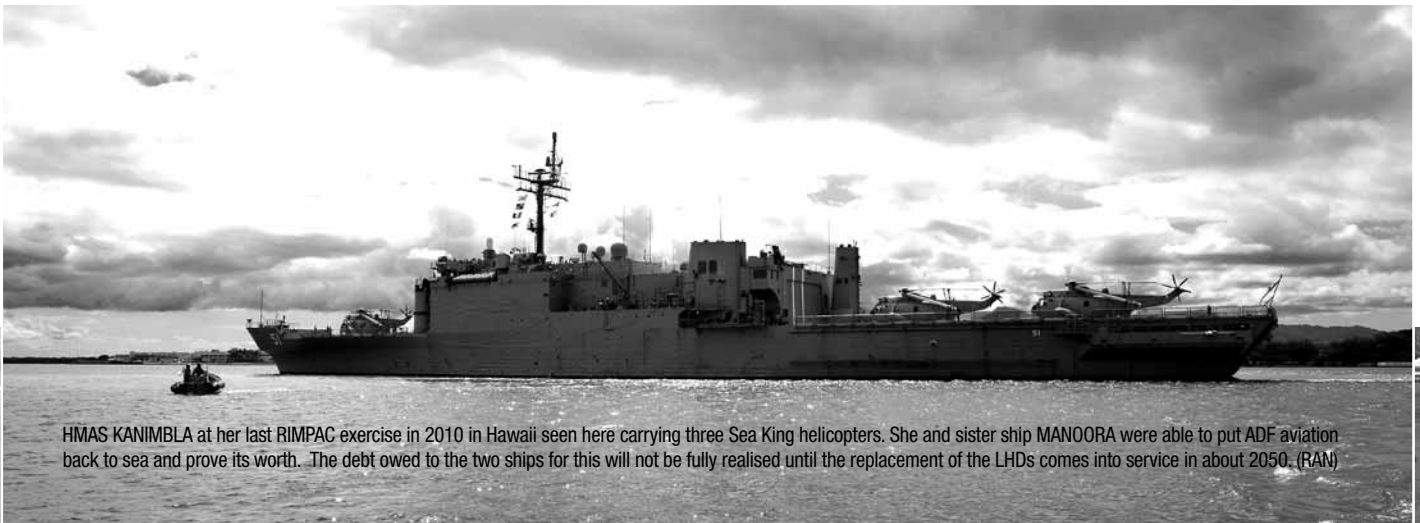
"Today it is also important to acknowledge the hard work of KANIMBLA's past and present serving personnel. They are the lifeblood of the ship, and KANIMBLA's proud history is theirs. Their dedication is what has allowed KANIMBLA to respond to the numerous taskings directed by Government in both war and peace."

"KANIMBLA's successes will be built on into the future with the introduction of the Canberra class Landing Helicopter Dock providing advanced amphibious capability to Navy."

"To tide us over until the LHD's arrive, ADFS (Australian Defence Force Ship) CHOULES will shortly be commissioned, enabling Navy to continue its vital role in the region."

HMAS KANIMBLA was built for the United States Navy as USS SAGINAW and was commissioned into the Royal Australian Navy in August 1994. She underwent extensive modifications for her new role as a helicopter capable amphibious transport ship.

What future disposal method awaits both LPAs is still unknown. But given the legal challenges presented over the sinking of the former HMAS ADELAIDE off NSW as a dive wreck sinking may not be an option.



HMAS KANIMBLA at her last RIMPAC exercise in 2010 in Hawaii seen here carrying three Sea King helicopters. She and sister ship MANOORA were able to put ADF aviation back to sea and prove its worth. The debt owed to the two ships for this will not be fully realised until the replacement of the LHDs comes into service in about 2050. (RAN)



HMAS KANIMBLA leaving Sydney Harbour during the later part of her service with the RAN. What fate awaits her and sister ship MANOORA remains unknown (Chris Sattler)



# BOOKS

## Confronting Al Qaeda New Strategies to Combat Terrorism


By Kevin McGrath  
 Naval Institute Press  
 ISBN 978-159114-503-5 2011  
 Hardcover: 336 pages  
 Reviewed by: Frank Horrigan

One instinctively likes the author by his frank admission, on his return from a third trip to Afghanistan, that ‘...a long term strategy...still has a long way to go’. Indeed and amen! In 2006 I was stood looking over a now overly-familiar border land in North West Pakistan. A very proper and British looking Pakistan Brigadier was pointing me in my chest and saying: ‘where have you been these last sixty years’. I responded in some lame, post-modernist, post colonial, apologetic type-of-way. He looked at me aghast: ‘I am not talking about your physical presence; I am talking about your thinking. We have known you for over 300 years; yet you have not been thinking these last sixty years: where have you been?’ Where indeed? Which makes Thucydides opening quote about ‘entering a war “back to front” and fighting first; then beginning to think’ all the more poignant. And 2005-2006 will probably be seen as the ‘fulcrum years’. Years when, pressed in Iraq, the ball swung back into the hands of the Taliban and Al Qaeda. Five years later, as President Obama begins the withdrawal, things do not look much better.

The war in Afghanistan began on a discretionary basis. Yet almost ten years later, the war has become one of institutional survival. Where the institutions – post the Financial Crisis of 2007-8 – include not just NATO and the Armies, Navies and Air Forces of the US, the UK and their principal allies but, potentially, the old world order defined at Breton Woods, including: the UN; the IMF; the World Bank and even the EU. The issue here, which McGrath is right to address, is that the so called war was fought by armies against an idea or concept – that of terrorism. Chris Donnelly CMG previous Head of the UK research group ARAG, has testified that war is about ideas and a battle of ideas and principles in which the ‘best survive’. The ideas being fought over are those of a ‘nomadic, tribal, aggressive mutation of an Abrahamic faith’. A faith whose munificence preserved and advanced the sciences, languages, medicines, mathematics and libraries of the ancient world during the Dark Ages. Set against this ‘idea’ has been that of Liberalism and the enlightened concepts of the West; locked into a new age of information and technology. Yet which message has prevailed and which has proven more attractive? It is the message of exclusion, enabled by a perverse reading of multiculturalism that, in effect, has enabled “self-ghettoisation” and that has prevailed in the East End of London, West Yorkshire and elsewhere in Europe and, indeed, the US. This has been the real ‘battlespace’ against which, as McGrath notes, ‘the US has been ineffective in countering Al Qaeda’s power beyond the battlefield’. And this is the ‘interspace’ of ideas and concepts where the West of all entities should have been both thinking and leading, politically, militarily and economically. What have we given Afghanistan? What attractive alternatives have we brought to the country that would enable an integrated counter insurgency campaign to succeed?

Published just before the death of Osama Bin Laden, this book may, in some regards, represent Churchill’s end of the beginning. Let’s hope so. The book is naturally US in its logic-positive approach and discourse. Indeed, the US is to be admired for two reasons: first, its commitment

and passion to prevail after the shock of 9/11 and, secondly, the way its armed forces have learned and responded. As have those of the Netherlands, the Canadians and the Australians. But other Allies have either not learned fast enough and / or now find themselves paying the very heavy price of perceived strategic political failure. Nowhere more is this the case than in the UK. Failure is now being blamed by the closed political-bureaucratic elites on the military. There is blame to be had but McGrath’s interpretation plays entirely into the hands of those such as Sherard Cowper-Coles. The institutions, politicians and bureaucrats have failed the military more so by failing to promote the concept and idea of the Liberal virtues. They have forgotten who are what they are and have been prepared to hide behind the skirts of Kipling’s Tommies. And those wonderful Tommies from Australia, the US, the UK, the Netherlands, Denmark, Canada, Australia, Pakistan, Iraq, Afghanistan and countless other ‘Coalition’ nations have fought, been wounded and died; led mostly by Political donkeys. We simply have not been thinking. And the longer we now stay – the more immoral our posture becomes. What are we achieving by staying other than to remain trapped where our enemies want us? Which, given the post Great Recession threats rapidly emerging, should be all the more reason to get out from under as quickly and expediently as possible. The answer, as McGrath testifies, is political and diplomatic, but the question he leaves us with is ‘have we the guts to lead us out of this mess to a new city on the hill?’ For without that idea to fight for / with and which will bring people ‘into our shura’ there will be no real, tangible and lasting victory. I am not sure McGrath’s conclusions are right but his analysis is. Worth buying and worth a read. ■



## THE HISTORY OF THE NAVY LEAGUE OF AUSTRALIA

The Federal Council of the League is planning to produce a history of the organisation, dating from the time its first branches were formed in Tasmania in 1900 up to the present day. In this regard it has commissioned Mr Malcolm Longstaff, who has been a member of the NSW Division Executive Committee since 1970, to undertake the necessary research as a prelude to the production of the history in a form yet to be decided.

If any reader, including especially those who may have been office-bearers in a Division, has any personal reminiscences or memorabilia relating to their involvement with the League that they believe may assist the research, it would be appreciated if they could as a first step **kindly contact Malcolm:**

**Telephone:** Sydney (02) 9988 3563  
**E-mail:** [nla.history@inet.net.au](mailto:nla.history@inet.net.au)

**In writing:** Navy League History  
 PO Box 518  
 Turrumurra NSW 2074

The strategic background to Australia's security has changed in recent decades and in some respects become more uncertain. The League believes it is essential that Australia develops the capability to defend itself, paying particular attention to maritime defence. Australia is, of geographical necessity, a maritime nation whose prosperity strength and safety depend to a great extent on the security of the surrounding ocean and island areas, and on seaborne trade.

## The Navy League:

- Believes Australia can be defended against attack by other than a super or 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 to our allies.
- Supports the ANZUS Treaty and future reintegration of New Zealand as a full partner.
- Urges close relationships with regional powers and particularly with the nearer ASEAN countries, PNG and South Pacific Island States.
- Advocates the acquisition of the most modern armaments, surveillance systems and sensors to ensure that the Australian Defence Force (ADF) maintains some technological advantages over forces in our general area.
- Advocates a significant deterrent element in the ADF capable of powerful retaliation at considerable distances from Australia.
- Believes the ADF must be capable of protecting essential shipping both coastally and at considerable distances from Australia.
- Endorses the control of Coastal Surveillance by the defence force and the development of the capability for patrol and surveillance of the ocean areas all around the Australian coast and island territories, including the Southern Ocean.
- Endorses measures being taken to foster a build-up of Australian-owned shipping to assist the economy to support the ADF and to ensure the carriage of essential cargoes to and from Australia in time of conflict.

**As to the RAN, the League,** while noting the important peacetime naval tasks 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 in both the Pacific and Indian Ocean proximate areas simultaneously and advocates a gradual build up of the Fleet and its afloat support ships to ensure that, in conjunction with the RAAF, this can be achieved against any force which could be deployed in our general area.
- Believes that the level of both the offensive and defensive capability of the RAN should be increased and welcomes the Government's decisions to acquire 12 new Future Submarines; to continue building the 3 Air Warfare Destroyers (AWDs) and the two landing ships (LHDs); and to acquire 8 new Future Frigates,

a large Strategic Sealift Ship, 20 Offshore Combatant Vessels, 24 Naval Combatant Helicopters, and 6 Heavy Landing Craft.

- Noting the deterrent value and the huge operational advantages of nuclear-powered submarines in most threat situations and the need to train our own submarine forces, recommends that the future force include proven off-the-shelf nuclear-powered vessels.
- Noting the considerable increase in foreign maritime power now taking place in our general area, advocates increasing the order for Air Warfare Destroyers to at least 4 vessels.
- Welcomes the decisions to increase 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.
- Advocates that a proportion of the projected new F35 fighters for the ADF be of the short-takeoff and vertical-landing (STOVL) version to enable operation from small airfields and suitable ships in order to support overseas deployments where access to secure major airfields may not be available.
- Advocates that all warships be equipped with some form of defence against missiles.
- Supports the development of Australia's defence industry, including strong research and design organisations capable of constructing and maintaining all needed types of warships and support vessels and advocates a continuous naval ship-building programme.
- Advocates the retention in a Reserve Fleet of Naval vessels of potential value in defence emergency.
- Supports a strong Naval Reserve to help crew vessels and aircraft and for specialised tasks in time of defence emergency.
- Supports a strong Australian Navy Cadets organisation.
- Advocates improving conditions of service to overcome the repeating problem of recruiting and retaining naval personnel.

## The League:

- Calls for a bipartisan political approach to national defence with a commitment to a steady long-term build-up in our national 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.



The test F-35B BF-02 makes its first approach to the USN LHD USS WASP for initial at sea and deck trials of the STOVL supersonic stealth fighter. The aircraft performed flawlessly in all tests. (USN)



The mine hunter HMAS GASCOYNE passes the Anzac frigate HMAS BALLARAT in Sydney Harbour. (Chris Sattler).



The decommissioned Spruance class destroyer PAUL F. FOSTER at sea again trialling a new bio fuel mix as well as filling the role of 'Self Defence Test Ship' for the USN's latest advances anti-ship missile defence equipment. Having a ship like the FOSTER for live fire tests will provide a force multiplier effect to the USN during future conflicts. (See Flash Traffic this edition for more information) (USN)