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VOLUME 70 NO. 3

\$5.95 (including GST)

# THE NAVY

The Magazine of the Navy League of Australia

*Super Hornet –  
The USN's Future*

*The Surface  
Warship as  
Force Multiplier*

*How to Fly a  
Sea Harrier  
Part 3  
– The Landing*

*Australia,  
A Maritime  
Nation?*

*Australia's Leading Naval Magazine Since 1938*

ISSN 1322-6231



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The Navy League of Australia is holding a second maritime essay competition and invites entries

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- 20th Century Naval History
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Submissions should include the writer's name, address, telephone and email contacts, and the nominated entry category.

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



# THE NAVY

## Volume 70 No.3

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Front cover: Front cover: Three USN F-A-18F Super Hornets in formation over the sea. The Super Hornet is now the USN's leading fighter, strike, attack, refuelling and EW attack aircraft. (USN)

All letters and contributions to:

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**All Subscriptions, Membership and Advertising enquiries to:**

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**Deadline for next edition 10 Aug 2008**

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### Synergy Opportunities and the new White Paper - let's not relearn Gallipoli

Sometime in the next six to eight months the new Rudd Government's Defence White Paper will be published. It will be the first Defence White Paper since 2001 and will be a test of the new government to ascertain if old Labor or 21st Labor is 'at the helm'. Many have labelled their recent Budget as typical old Labor with its high taxes, increased spending, means tests and attacks on the so called rich. If so, then this may not bode well for Defence, particularly Navy.

In the defence portfolio old Labor favoured a continental defence model. This required forces to be dispersed around the country to defend 'the homeland'. Given Australia's size, particularly its long coastline, there was never going to be enough to do the job properly as threats could have come from many directions. It also ignored offshore interests. A key requirement for this strategy to work is to increase defence spending. Although, paradoxically, it was probably adopted as a means to cut defence spending.

The previous coalition government adopted an opposite strategy with a more forward looking/engagement model. It required forces to be sent to trouble spots overseas where the concentration of the ADF's resources provided an asymmetric advantage to defeating significant threats.

Different national defence strategies call for different force structures and equipment. The strategy chosen for the new White Paper will shape future acquisitions and potential upgrades and synergies of legacy platforms for many years. One of the potential synergies that could be exploited in the White Paper is that of the

new Canberra class LHDs and the F-35 JSF.

The LHDs will provide Australia with the ability to take significant land forces offshore to stop trouble reaching Australia, our region or affecting our interests (which in a globalised economy will affect our way of life). Experience has shown that land forces deployed without organic air support are extremely vulnerable from the ground and air. Also, that 3rd party basing assistance for land based fighters to support such offshore operations is generally only forthcoming when that host nation realises that the force can operate just as well without their assistance.

Like it or not, the ADF's new amphibious capability will be used at some stage, and when used will mean the situation is a serious one requiring serious and decisive firepower. Landing uninvited in someone's country should not be done half hearted.

As Australia will more than likely go down the F-35 JSF route, and with a common airframe variant having a STOVL (Short Take Off and Vertical Landing) capability, a solution to the ADF's requirement for organic air support seems quite obvious.

STOVL aircraft require none of the added costs of launch and recovery equipment such as catapults and arrestor wires. They can operate from bear decks such as found on the LHDs to grass paddocks.

A Flight of four - six RAAF crewed STOVL JSF on each LHD can provide the tactical support needed for amphibious operations in and around our region. Trying to provide that support through other means while politically attractive to the uneducated masses,



(from top to bottom) The Ticonderoga class cruiser USS ANZIO, the Nimitz class super carrier USS EISENHOWER and the LHD USS SAIPAN. The USN does not recognise the STOVL fixed wing element on the LHDs as providing anything other than tactical air support for the marine force it carries. A super carrier like the EISENHOWER, or land based fighters, will always be needed to provide offensive airpower to defend the ships of the fleet. (USN)



The first production model of the F-35 STOVL JSF. Four-six JSF on each LHD will be able to provide the embarked force with the necessary tactical fire support required to prevail on the modern battlefield. Without it, all the LHDs can do is repeat the mistakes of the Gallipoli campaign by delivering forces ashore without the firepower support needed. (Lockheed Martin)

will actually cost more and be significantly less effective, and more importantly non-persistent. Achieving a synergy between the LHDs and the JSF will save money, and more importantly lives.

This is by no means an 'aircraft carrier' capability by stealth being proposed (as some hysterical naysayers reading this column will claim). Four - six fixed wing aircraft do not make an aircraft carrier capability. The LHDs will still require the RAAF's land based fighters to provide the necessary air defence element for a sea control strategy. The synergy proposed here is exactly the same as the USN/USMC currently enjoy with their LHDs and STOVL Harrier force.

USN doctrine quite rightly does not recognise the Harrier carrying LHD as a self supporting aircraft carrier. But rather one that needs the support of the USN's super carriers to operate in harms way. The embarked fixed wing element on the LHDs is used exclusively as airborne artillery to support the land forces ashore, as it is far more responsive to their needs than land based or carrier based aircraft.

The question that needs asking now while the White Paper is being written is, 'are Australian troops worth protecting'? And despite the ADF's amphibious warfare doctrine stating that there will be no opposed landings, at some stage the amphibious operation will be opposed, as the enemy is unlikely to invite us in and allow us to build up a strong foothold in their country. In the inevitable event of a future amphibious operation, the ability to call up two JSFs loitering overhead each carrying two 2,000lb GPS guided bombs in their internal bomb bay will prove decisive on any battlefield for the disembarked force. However, without an airborne

fire support capability, all the LHDs can do is deliver our troops into the waiting machine gun sights of the enemy, in many respects, just like at Gallipoli.

Another aspect for the new White Paper is the enduring nature of our region's maritime geography. Given that geography, fault lines and dispute points between regional neighbours will naturally be maritime. With this in mind the RAN should be at the forefront of any new defence strategy. This is not to say that Australia should be a maritime police man or invest in naval power at the expense of a balanced joint military force. Rather, it should be recognised that having a world class highly capable and advanced fleet gives Australia an obvious leadership role in any future regional coalition of military forces. This in itself would have a stabilising effect given Australia's Foreign Policy and engagement towards the region. With a smaller less capable navy centred on sea denial assets like submarines (as in a continental defence strategy) the opportunities for lasting peace and stability are gone. Submarines cannot lead naval task forces, they cannot support forces ashore, they cannot protect convoys and they cannot conduct air defence or theatre ballistic missile defence. Their role in the future battlespace is important but it must be remembered that it is limited.

*Themistocles*

There would be very few people with an interest in naval matters, and in the RAN in particular, who would not know of the discovery on the 16th March this year of the wreck of HMAS SYDNEY (II).

The total loss of the ship and the 645 crew has remained a mystery for more than sixty years. While the full story of the loss of HMAS SYDNEY (II) is yet to be satisfactorily explained, at least and at last the position of the ship is identified.

Great credit must go to the crew of the search ship *Geosounder* and to all involved in the successful search. The ship was found some 115 miles off the West Australian coast. It is at a depth of 2470 metres.

Not only has HMAS SYDNEY (II) been located, but the remotely operated vehicle employed by *Geosounder* has obtained high quality pictures of the sunken ship. It is to be hoped that these images will assist in the investigation that will now take place in an effort to ascertain the circumstances that led to the loss of the vessel which at the time was (and possibly still is) the RAN's best known ship.

The successful search also located the wreck of the German raider HSK KORMORAN. It was found first. The distance between the two ships is approximately twelve miles.

Immediately it was known that the search had been successful it was determined that there would be both a National Memorial Service in Sydney and a Commemorative Service at sea.

The Memorial Service was held on the 24th April in Saint Andrews Cathedral Sydney. The Cathedral was filled, with an overflow of people standing outside, watching the service on a large TV screen. The Senior Vice President of the League, Rear Admiral Andrew Robertson, participated in the service giving a history of the ship and explaining its importance to Australia in 1941 (his address is reproduced below)

The Commemorative Service at sea was held off the West Australian coast on the 16th. I was invited by the Chief of Navy to attend the Service. The party that joined HMAS ANZAC at Geraldton included the Chief of Navy, the Minister for Defence Science and Personnel, the Shadow Minister, the German Ambassador, CDRE Burnett – the son of Captain Burnett – with four others representing relatives of the lost crew, and the President of the Naval Association. We also had with us several members of the *Geosounder* crew.

Before boarding HMAS ANZAC we visited the impressive memorial to SYDNEY (II) which has been built at Geraldton. I had not previously appreciated the extent of the links Geraldton had had with the ship.

The Service at sea was held at 0730. It was a rather grey early morning. HMAS ANZAC was positioned above where SYDNEY (II) lay 2470 metres below. The Service was a simple but moving Naval ceremony.

A young Lieutenant gave the historic setting of the sinking. The Principal Chaplain read the Naval Psalm and gave a Reading. There was a message from the Governor General. There were Prayers. The Chief of Navy read the Naval Prayer. We sang the Naval Hymn "Eternal Father, strong to save....". There was a Prayer of Dedication and after the reading of the Naval Ode the laying of the remembrance cylinder and wreaths was performed by the Chief of Navy, together with the CDRE Burnett and the other relatives representatives.

The Last Post, a minutes silence, Reveille and the Blessing

concluded a ceremony we all felt fortunate to have been able to attend.

HMAS ANZAC then proceeded to where HSK KORMORAN lay. There followed a short service at which the German Ambassador lay a remembrance cylinder and wreath for the 79 German seamen lost in the battle.

When it became clear that HMAS SYDNEY (II) had been found I wrote to the Prime Minister asking that the ship, with its 645 crew, be declared a War Grave.

The Minister for Defence Science and Personnel in reply has informed me that the ship will be protected under the Historic Shipwrecks Act, it will not be classed as a War Grave. Apparently the legislation pertaining to War Graves is quite specific and does not extend to sunken warships.

The wreck sites of both HMAS SYDNEY (II) and HSK KORMORAN have been declared historic shipwrecks. A protection zone of 200 hectares has been declared around the sites. It is intended that this declaration will protect the ships, their crews and relics from damage, disturbance or removal.

There is, so far as I know, now only one RAN vessel not accounted for, the submarine AE1. The AE1 was operating in support of the landings made near Rabual (then a German possession) in September 1914. The submarine disappeared. No trace of it or the crew has ever been found. Now that HMAS SYDNEY (II) has been found it is to be hoped that a search can now be mounted for AE1. It may be that the equipment of today will enable the submarine to be located.

There are no doubt many reasons why we should seek to find AE1. One is that it is necessary to continue to remind our fellow Australians of the sacrifices made at sea. On occasions like Anzac day there is, unsurprisingly, a great deal of emphasis on land warfare and the losses sustained by Army.

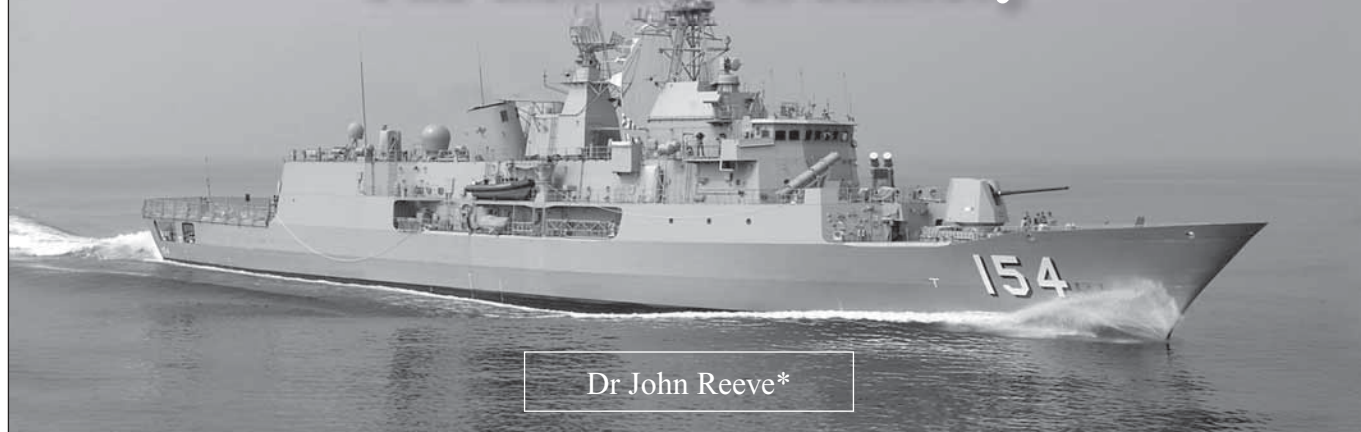
Rear Admiral Robertson pointed out to those present at the service in Saint Andrews Cathedral, that the 645 men lost in HMAS SYDNEY (II) represented a greater number than all those lost in the Korean War, or in the Vietnam War or at Kokoda.

The discovery of AE1, should it ever occur, will help to remind Australians, as the discovery of HMAS SYDNEY (II) has done, of the price paid by members of the RAN in defence of our island nation.

Graham Harris



# The Surface Warship as Force Multiplier: The Lessons of History



The Anzac frigate HMAS PARRAMATTA. RAN frigates are the smallest ADF units regularly deployed alone on extended military missions, thus allowing political and financial economy of force. Since the delay in the FFG upgrade programme, and with their consequent inability to deploy overseas, the Anzac frigates have been rightly called the workhorses of the fleet. (RAN)

**What do strategic trends in the early 21st century Asia-Pacific region mean for Australia's future naval operational and force structure requirements? Prominent naval historian, Dr John Reeve, considers this question against the background of modern history. It also makes a compelling case for the upcoming new Defence White Paper to consider.**

## History, Policy and Procurement

History is indispensable to military forces. It is a vehicle of tradition, of service education, and an invaluable tool for force planners, strategists and commanders. One may speculate about discontinuity and a different kind of future, but history remains essential. Sun Tzu and Clausewitz, in their different ways, recommended the study of history. Julian Corbett was a great strategic thinker – the most brilliant analyst ever to reflect on maritime warfare – because he was first a great historian. The great commanders have frequently studied the long sweep of history as a function of their successful approaches to war. MacArthur used the case of Wolfe's approach to Quebec in 1759 to explain his planned amphibious attack at Inchon during the Korean War. None of this should surprise us. History remains a known quantity – real, unclassified, and with a verifiable outcome, and a rich source of experience in its infinite variety of case studies. It is a vast extension of personal experience, and historical ignorance can lead to serious losses. The Royal Navy, for example, learnt the lesson of convoy three times between the 1790s and the 1940s. History teaches, above all, that there is a dialogue between change and continuity in human and military affairs, and a need for strategic awareness combining readiness for the likely and unlikely. It teaches the need for flexibility.

Military force structure decisions should be historically literate. They should also be policy-driven. The Australian defence policy tradition has always been a balance (perhaps an oscillation) between local and wider concerns. Today, as ever, our defence policy must encompass issues of local regional stability as much as essential concerns as distant as Afghanistan and the Gulf. In the future Australia may need to act nearby or far away in defence of its territory, landward or maritime, or its interests. Those interests comprise its role as a good international citizen as well as its own national security

and prosperity. History suggests that all these priorities will remain part of the policy-strategy continuum. This means a need to consider both global and nearer regional constants and trends, building force structure and capability accordingly.

## Australia's Evolving Strategic Environment

The world has changed since the optimistic days of Cold War victory in the 1990s. Australia's major strategic partner, the US, has potential rivals in our wider region, the Asia-Pacific. They include, in different ways, China, India, and perhaps Russia – all developing maritime powers. There is global competition for resources, especially oil, an issue bound up with sea transport. International terrorism has become an ideological enemy and lethal threat. It has struck on land and sea and required maritime power projection as far inland as Afghanistan.<sup>1</sup> Environmental change implies security and humanitarian issues. Failing states in the archipelago to Australia's north mean a need to help maintain stability in its near neighbourhood. Fulfilling this responsibility can also obviate opportunities for hostile or unhelpful outside involvement. In South East Asia, prosperity and rivalries are causing an expansion of military capabilities which might be termed an arms race.

Certain factors, however, are enduring. The wider Asia-Pacific remains maritime-littoral: a land-sea interface between great oceans and characterised by vast distances. Military operations within it are predicated on the need for reach.<sup>2</sup> Australia shares interests with other regional states, as it has historically, in terms of international stability and the security of the sea lines of communication (SLOCs).<sup>3</sup> Australia remains a maritime nation not only in its geography and territoriality, but in its dependence on the sea for economic well being. The great bulk of its trade, by value as well as volume, is seaborne



Sea Control's ability to dominate events on the land is unchallenged, as seen here with British troops guarding Argentine prisoners at the conclusion to the Falklands Conflict. Despite being outnumbered on the ground and in the air, the British forces were able to prevail given their Sea Control strategy. One dimensional denial strategies have lost to Sea Control for centuries, for example, France in the age of sail, Germany in the two World Wars, the USSR in the Cold War and Argentina in the Falklands.

and within the Asia-Pacific. The mineral boom being fuelled by the economic expansion of China and India, and by the continuing resource needs of the rest of East Asia, means that this is unlikely to change suddenly.<sup>4</sup> SLOC security is doubly important for Australia: the SLOCs of its trading partners are also essential to its own economic success.

Australia's key strategic interests, and their local and wider contexts, are all unquestionably maritime ones. The region involved is vast, both geographically and demographically, and stretches potentially from the Gulf to North East Asia. Australia's population is small. It must seek to leverage technology, military capability and diplomacy to maximise strategic policy outcomes. Force multiplication is, for Australia, a strategic necessity.

## Maritime Strategy

There is a fundamental point about maritime strategy. The sea is one, a single and unified environment. Sailors have made big charts for generations for good reason. That environment can be a tool for oneself or a highway for one's enemies. There is no option but sea control, when and where required, for a maritime nation. Without it a maritime power is eligible for defeat. One dimensional denial strategies, usually the preference of continental powers - whether utilising privateers, surface raiders, submarines or land-based air power - have lost to maritime powers with sea control for centuries. France in the age of sail, Germany in the two World Wars, the USSR in the Cold War and Argentina in the Falklands all opted for sea denial and were defeated. For a denial strategy to succeed, it must itself be predicated upon sea control. Nothing illustrates this better than the two major submarine campaigns of the Second World War. German U-boats could not deny the Atlantic powers the use of the sea since they could not control it in every dimension: over, on and under it. US submarines, by contrast, empowered by the controlling dominance of the US Pacific fleet, prosecuted one of the most devastating blockades in naval history. This was consistent with the conclusion of both the classical maritime strategists, Mahan and Corbett, that denial is not feasible without sea control.<sup>5</sup> A case study in Australia's near region, which it can never afford to forget, is how sea control enabled Japanese forces to

lodge in the northern archipelago in 1941-42, and how it was needed to dislodge them, defeating their denial strategy based upon land-based air power.<sup>6</sup> The minimal 'capability edge' for Australia must in fact be an effective strategy of sea control. Here lies the significance of the role of the future RAN Air Warfare Destroyer (AWD) in conjunction with other naval and joint (and possibly coalition) capabilities: as an operational enabler by facilitating sea control.

## The Operational Agenda

Sea control can enable a menu of maritime operational missions in defence of Australia's strategic interests. Nothing is more important than the security of the commercial SLOCs. These are essential not only to a maritime nation's economic viability but also to its financial sinews of war, its ability to sustain a fight. As Prime Minister Alfred Deakin wrote in 1905, 'Nowhere are maritime communications more important than to Australia, seeing that our dependence upon sea carriage is certain to increase rather than diminish as population and production advance.'<sup>7</sup> Such foresight inspired Deakin to promote the building of the Australian fleet which was ready in 1914. Today, his words are as true as ever. Submarine forces are also growing globally. SLOC defence is an international responsibility, necessarily undertaken in conjunction with friends and allies, so interoperability is essential.

Joint force operational capability will also be essential: to be able to lift, deploy, protect, supply, and perhaps evacuate Australian forces in the near region. This mission is implicit in the building of the new amphibious ships (the LHDs), as well as in the history of national operations in the archipelago from the First World War to the Timor deployment of 1999-2000 and beyond. General Peter Cosgrove has stated: 'Another military blinding glimpse of the obvious is the utility of sea power in the East Timor operation. The persuasive, intimidatory or deterrent nature of major warships was not to me as the combined joint force commander an incidental, nice to have 'add on' but an important indicator of national and international resolve and most reassuring to all of us who relied on sea lifelines.'<sup>8</sup>

Australia's strategic situation implies a variety of other maritime missions: lower intensity operations in the form of counter-terrorism, as in the Gulf since 2003;<sup>9</sup> continual constabulary duties relating to border protection, fisheries,



(from front to back) The Type 42 destroyer HMS EXETER and the Arleigh Burke class destroyer USS McFAUL. The surface warship is one of history's most successful weapons systems, perhaps the most successful, and vital to the force structure of any maritime power. Today more than ever it is a strike platform with trans-oceanic reach, as HMS EXETER proved with her successful deployment to the Falklands Conflict in 1982. (USN)





HMAS SYDNEY (III) departing Sydney Harbour. SYDNEY conducted strike missions against enemy supply lines as well as giving ground troops accurate close air support during the Korean War. Her operations enabled the Australian government to avoid having to commit additional troops. (RAN)

drugs and contraband, piracy, and environmental protection; diplomacy, presence, and support for peace monitoring, as in Bougainville in 1998; and humanitarian assistance as in Sumatra in 2005 after the earthquake and tsunami. Some of these activities can involve high threat environments, operational endurance, the need for visibility and an impression of power, or all three, and are best performed by major warships.

This agenda involves a multiplicity of roles and levels of force, consistent with a new emphasis within maritime nations on a wide variety of sea power roles.<sup>10</sup> It also implies operational reach, likely to be as necessary in the future as when Australian forces served, for example, in the Mediterranean and North Africa during the Second World War. Capability will need to be interoperable, as well as joint, and deployable on multiple missions and in multiple theatres simultaneously. This is a tall order for a small to medium power whose force structure will be limited. At the operational level, therefore, force multiplication must again be the key, leveraging capability in terms of functions, political-diplomatic contexts, space and time. The solution has been at hand, and worked so well, for so long that one might be forgiven for forgetting its merits. The surface warship is one of history's most successful weapons systems, perhaps the most successful, and intrinsic to the force structure of a maritime power.

## The Surface Warship as Force Multiplier

The modern surface warship came on the scene about the year 1500. Today infinitely more capable, strategically it remains what it was then: a strike

platform with trans-oceanic reach. Its inherently strategic character derives from this combination of mobility and lethality. Everything in maritime strategy flows from this. The surface warship has been one of history's greatest force multipliers, alone creating global strategy and international relations. It allowed small states (Portugal, Spain, Holland and England) to create world-wide empires. Here is a lesson for Australia, with no imperial ambitions but disadvantaged in size, in 'the leverage of sea power'.<sup>11</sup> When employed to the extent of its potential, the surface warship has been a natural instrument for the establishment and exercise of sea control.

The operational capability of the twenty-first century destroyer or frigate is remarkable. It has battlespace awareness and warfare capability in four dimensions: on, over and under the sea and in the electro-magnetic spectrum. Its fuel capacity and sea-keeping and carrying abilities enable its reach, endurance and logistic self-sufficiency, like those of the British ships-of-the-line during the long blockades of France. It can cross the deepest oceans but has shallow draft to penetrate waterways. It can poise in the area of operations and needs no forward operating base. Operating in international waters, it does not require entry permission or host nation support. It can cover or threaten large areas, tying down or confusing opponents – in Kuwait in 1991 as at Quebec in 1759. It can operate independently, in task groups, in joint operations, or interoperably as part of a coalition. It bridges a gap between the patrol vessels employed for policing duties and higher capability warships such as cruisers and aircraft carriers.<sup>12</sup> RAN frigates are the smallest ADF units regularly deployed alone on extended military missions, thus allowing political and financial economy of force. They have been rightly called the workhorses of the fleet. The modern intermediate surface combatant has the same versatility as its ancestor, the British 74-Gun ship-of-the-line.

The ability to hit, threaten and protect is intrinsic to all operations of the surface warship. In modern terms this can range from simple gunfire to cruise missiles with enormous range for precision strike, able to reach Afghanistan in 2002, for example, from the Gulf of Oman.<sup>13</sup> Warships can also carry significant quantities of munitions. Carrier-based organic air power is effectively an extension of traditional surface strike capability. HMAS SYDNEY in the Korean War, for example,



HMAS COLLINS in Jervis Bay. An unbalanced fleet, with over investment in one kind of platform, will produce a significantly reduced overall capability. Submarines alone cannot provide the dominance needed for sea control, and have never succeeded in doing so in outright maritime warfare. Their role is important, but must be recognised as being limited. (John Mortimer)



The force multiplier effect from a large flat decked ship able to employ the 'joint force capability' is immense. To be able to lift, deploy, protect, supply, and perhaps evacuate Australian forces in the near region is implicit in the building of the new LHDs. Seen here is the first LHD for the Spanish Navy being launched.

conducted strike missions against enemy supply lines as well as giving ground troops accurate close air support. Its operations enabled Australia to avoid having to commit additional troops.<sup>14</sup> The advantage of organic air power at sea is range beyond that of land-based air. The issue is not the specified range of any particular land-based aircraft, because it is not quantitative but qualitative. There is no guarantee that the need to operate will not occur beyond that range, whatever it may be. Many carrier operations during the Pacific War, for example, occurred beyond the range of land-based air.

The surface warship also has graduated force, with many

things it can do short of using lethal force. These include declaratory blockade, as during the Cuban Missile Crisis and the Iraq sanctions regime. This can avoid escalation, give time for negotiations, or apply a containment policy. Graduated force makes the surface warship a political as well as military force multiplier, invaluable in the broadening of options it gives to government.

## Two Key Missions

Various historical case studies show the effectiveness of the surface warship in key mission roles for Australia. From the Portuguese at the hands of the Dutch in the sixteenth and seventeenth centuries to Japan under American blockade, maritime powers have been fatally weakened by failure to defend their SLOCs. Britain, by contrast, survived two world wars by securing its sea lanes. By the 1940s the Atlantic was a joint operational environment, with RAF Coastal Command playing a key role, but adequate numbers of escort vessels were critical in the outcome of the campaign. Australia cleared its sea lanes, and ensured the safety of its troop convoys, within months of the outbreak of war in 1914 by deploying the deterrent power of the battlecruiser HMAS AUSTRALIA and destroying the raider EMDEN. By the 1950s the RAN had made anti-submarine warfare a specialty, but its surface force structure has remained integral to its ASW capability.<sup>15</sup>

The value of warships in joint operations was never more evident than in the Mediterranean and New Guinea during the Second World War. The defence of Tobruk during the siege, of great political as well as strategic value, was made possible by the famous naval 'ferry', including Australian destroyers, which brought in supplies and evacuated wounded and prisoners. New Guinea was a maritime-enabled campaign, fought in an



The Spanish Navy's F-100 frigate ALVARO DE BAZAN leaving Sydney. The minimal 'capability edge' for Australia's security must be an effective strategy of Sea Control. Herein lies the significance of the future RAN Air Warfare Destroyer (AWD) with its ability to network ADF units into a joint fighting force to control the below, on and over ocean environment. (Chris Sattler)





The USN Ticonderoga class cruiser USS VICKSBURG. For five hundred years sea power has never lost, and the intrinsic capabilities of the surface warship are the reason why. The surface warship is a remarkable weapons system and force multiplier whose effectiveness historically has been infinitely greater than the sum of its parts. (USN)

archipelago with poor land communications. Naval forces conducted surveys, minesweeping, amphibious lift and logistic support for ground and land-based air components. Australian warships escorted landing forces and provided gunfire support and air defence.<sup>16</sup> Allied ability to project power into the archipelago contrasts with German inability to invade Britain in 1940. The fundamental obstacle to a threadbare surface Kriegsmarine was the critical mass of the Royal Navy.<sup>17</sup> The ability to evacuate troops aboard warships was clear at Dunkirk (where most were taken off on destroyers) and Crete (where naval forces took terrible casualties rescuing the Army).

## The Myth of Surface Warship Vulnerability

All military units can become targets and are potentially vulnerable. But the notion that the surface warship has an undue lack of 'survivability' has never been proven. Its death has been predicted for over a century in the face of new weaponry such as torpedoes, aircraft and missiles, which it has itself adopted, just as it adopted the gunpowder, industrial and information revolutions. Threats have advanced, but so have warship defences, taking a quantum leap in the last quarter century. Layered and networked defence, to which warships are intrinsic – part of a system of systems, is enhanced by the difficulty of targeting a warship at a distance. The two salient cases of warships struck by missiles, HMS SHEFFIELD and USS STARK, are over twenty years old, and involved ships presenting co-operative targets.<sup>18</sup> Ship design can also optimise survivability in the event of a missile hit. World renowned military strategist Dr Norman Friedman observes

how bigger can mean safer and less sinkable.<sup>19</sup> The surface warship is also tactically a moving target (unlike for example landward air bases), hard to locate in the vastness of the sea, with its own high level capability, awareness and defences. Unlike land and air forces, it can also mitigate lower level threats such as terrorism by the expedient of putting to sea for an extended period.

## The Necessary Force Structure

A military capability is bound up with the force structure which ensures it. For reasons which have everything to do with technical issues of maritime warfare, naval forces must be balanced and adequate. The more complex the operational environment and the higher the operational tempo, the greater is the need for balance and adequacy. The traditional naval concept of a 'balanced fleet' is not sentimental but professional. It means having a functional force, prepared for likely eventualities, and sufficiently flexible for unlikely ones. The successful fleets of history, such as the Royal Navy in the Revolutionary, Napoleonic, and Second World Wars or the US Navy in the Pacific War, have been balanced fleets. Good naval commanders have appreciated the balance of their fleets and sought to unbalance those of their opponents. This was why Nelson cried out about 'want of frigates', and effectively why he wanted a 'battle of annihilation'. Unbalancing the Japanese fleet, by destruction of its carriers, was what the Allies achieved at Coral Sea and Midway. For a smaller power such as Australia, with a big operational agenda, balance, flexibility and force multiplication are at a premium. This



means adequate numbers of surface combatants without over commitment to another arm, for example submarines.

The British naval historian Stephen Roskill had a phrase: the fallacy of the single weapon. An unbalanced fleet, with over investment in one kind of platform, can have serious consequences in the form of truncated capability. Submarines alone, for example, cannot provide the dominance needed for sea control, and have never succeeded in doing so in outright maritime warfare. The defeat of the German U-boats in the Battle of the Atlantic was victory over a navy profoundly unbalanced in favour of submarines. Neither do submarines alone have the breadth of operational capability to exercise sea control. They lack, unlike surface ships, the visibility, accessibility, and graduated force for many diplomatic and constabulary duties. And they lack the three dimensional capability, which the surface warship has, to defend SLOCs and support joint operations. They are important components of the fleet, and perform valuable tasks by way of surveillance and strike for example. But compared with surface warships, they are not in the same way strategic units.

The surface warship is a platform, as well as a set of capabilities, and quantity matters as much as quality. Sea control is a function not just of capability but of numbers. This was Britain's problem during the early Battle of the Atlantic when it lacked sufficient escorts, and Australia's when the decline of its naval surface force between the wars had serious consequences when Japan attacked in 1941-2. The US Navy, by contrast, could prosecute the Pacific War not only because it won fleet actions but also because it had cumulative critical mass. Conversely, inadequate fleets, especially those facing high operational tempo, have suffered many defeats.

## Thinking and Investing

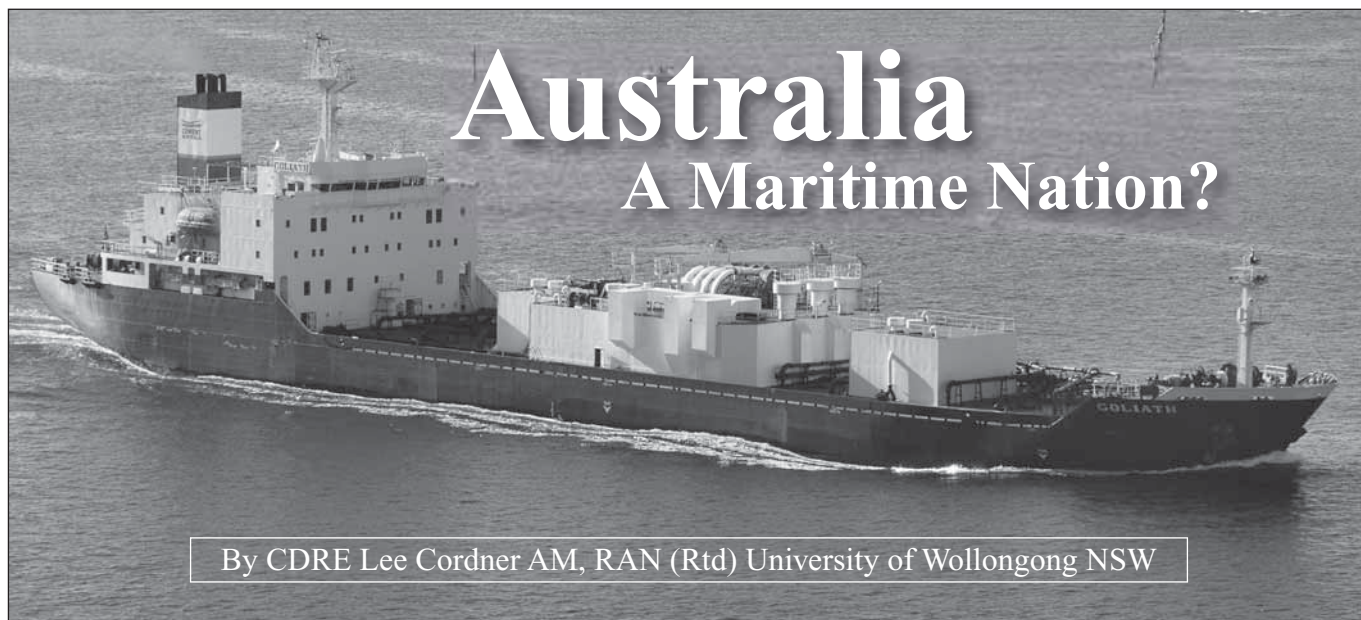
Australia must think flexibly and broadly in the complex, uncertain and demanding environment of the early twenty-first century Asia-Pacific. It must realise that the reach of naval-maritime power does not represent the ill-considered risk of global entanglements or imply a dangerous indulgence in 'expeditionary warfare', but constitutes an invaluable ability to engage in good international citizenship, protect and promote Australia's wider and nearer interests (without necessarily putting boots on the ground), sustain alliances and friendships, help in shaping the strategic environment, and deal with threats and situations, foreseen or unforeseen, at a distance before they reach our shores and perhaps even before lethal force, with all its human and political consequences, needs to be employed. In warfare, as in medicine, prevention is better than cure.

History has lessons for Australia's strategic policy context, maritime operational agenda, and naval capability and force structure requirements. The surface combatant is indispensable and enormous value for money. For five hundred years sea power has never lost, and the intrinsic capabilities of the surface warship are the reason why. The more one considers the strategic context and the greater the need for fiscal efficiency, the more attractive is the flexibility and synergy of this remarkable weapons system and force multiplier whose effectiveness historically has been infinitely greater than the sum of its parts. Its pay-offs go even beyond the political-diplomatic, strategic-operational and administrative-fiscal realms. In the defence of vital trade and the promotion of techno-industrial capacity and exports - through shipbuilding, logistic support, maintenance, repair and refits - it constitutes an investment in national economic health.

The implication of all this is the need to replace the RAN's Anzac class frigates adequately in terms of both capabilities and platforms, by means of the SEA 5000 project, while mindful of the demanding environment in which the ships will serve. The surface combatant force has been stretched during the last decade. Maritime operations, and more of them, are continually taking place. The question of a precise future force structure is beyond the scope of this article, but two things should be said. One is that for every warship deployed there must be one simultaneously in refit and one working up ('the rule of three'). The other is that naval shipbuilding has economies of scale. Expenditure on research and development, design, and set-up costs is amortised over the life of a project, so the cost per unit decreases as more ships are built. An adequate number of surface combatants, within a balanced fleet, are the minimal naval capability for a maritime nation such as Australia. A belief otherwise could be fairly suspected of lacking strategic foresight. Certainly, history would be against it.

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1. N. Friedman, *Terrorism, Afghanistan, and America's New Way of War* (Annapolis, 2003).
2. J. Reeve, 'The Development of Naval Strategy in the Asia-Pacific Region, 1500-2000' in G. Till (ed.), *Seapower at the Millennium* (Stroud/Portsmouth, 2001).
3. See website of the Australian Association for Maritime Affairs for useful links on maritime issues.
4. *Composition of Trade Australia* (Canberra, 2007), pp. 5-8, 10-11, 22-3.
5. M. D. Hoffman, 'The American and German Submarine Campaigns of the Second World War: a Comparative Analysis', BA honours thesis, School of History, UNSW@ADFA, 1998, p.65.
6. J. Reeve, *Maritime Strategy and Defence of the Archipelagic Inner Arc* (Canberra, 2001).
7. D. Stevens, *A Critical Vulnerability: The Impact of the Submarine Threat on Australia's Maritime Defence 1915-1954* (Canberra, 2005), p.13.
8. The ANZAC lecture at Georgetown University, 4 Apr. 2000.
9. J. Reeve, 'Maritime Operations and Counter-Terrorism: An Australian View' in J. McCaffrie (ed.), *Positioning Navies for the Future* (Sydney, 2006).
10. For example G. Till, *Seapower: A Guide for the Twenty-First Century* (London, 2004).
11. C. Gray, *The Leverage of Sea Power: the Strategic Advantage of Navies in War* (New York, 1992).
12. I owe this point to Commodore Jack McCaffrie RANR.
13. Friedman, *Terrorism, Afghanistan*, p.159.
14. J. McCaffrie, 'Korea: The First Challenge for Australian Naval Aviation' in D. Stevens and J. Reeve (eds), *Sea Power Ashore and in the Air* (Sydney, 2007), pp.183-5.
15. D. Stevens (ed.), *The Australian Centenary History of Defence, Vol. III: The Royal Australian Navy* (Melbourne, 2001).
16. A valuable reference work is J. Coates, *The Australian Centenary History of Defence, Vol. VII: An Atlas of Australia's Wars* (Melbourne, 2001).
17. D. Grinnell-Milne, *The Silent Victory: September 1940* (London, 1958).
18. M. Schweikert, 'Exploding the Myth of Surface Ship Vulnerability', *The Navy*, Vol 62, No.4, Oct.-Dec.2000.
19. N. Friedman, *New Technology and Medium Navies* (Canberra, 1999), pp.21-2.



One of the few Australian registered merchant ships, *Goliath*, entering Sydney Harbour. A former Government Minister once said “Australia is a shipper, not a shipping nation” to explain away the small size of the Australian flagged merchant fleet. Given how much of Australia’s trade relies on sea transport this statement is remarkably short sighted. (John Mortimer)

**Principal Research Fellow of the University of Wollongong’s Australian National Centre for Ocean Resources & Security (ANCORS), Lee Cordner, takes a look at the current maritime environment and situation that faces the new Rudd Government in the lead up to the many reviews it has initiated, as well as setting the scene for the new Defence White Paper. The facts and insights that follow may come as a surprise to many, including those in the sea services, academia and media.**

With the Rudd Government now firmly ensconced in Canberra and generating numerous initiatives and reviews it is appropriate to consider early indications of the attention being paid to Australia’s maritime interests, particularly maritime security. Some initiatives that may have implications for Australia’s maritime future include the *Australia 2020 Summit* held in Canberra on the weekend of 19-20 April 2008; the *Homeland and Border Security Review*, headed by Mr Ric Smith AO PSM, former Secretary for Defence, due to report to Government 30 June 2008; the *Inquiry into Coastal Shipping Policy and Regulation*, submissions were required by 11 April 2008 to the House Standing Committee on Infrastructure, Transport, Regional Development and Local Government; and the *Defence White Paper*, which is due to be released before the end of 2008. The Prime Minister has also foreshadowed a national security statement; a foreign affairs white paper has been mooted as has an energy security strategy.

Most of the initiatives listed are in progress so their collective impact for maritime Australia remains to be judged. However, for those who think the maritime agendas for Australia’s future deserve priority attention the outcomes of the *Australia 2020 Summit* were not encouraging. The *Summit Initial Report* makes no mention of any issue, factor, suggestion or initiative to do with maritime matters, the sea or the oceans. It seems that the majority of the nations 1000 “best and brightest”, in common with many other Australians, see Australia as “girt by beach”. How important is the sea to our future? To what extent is Australia a maritime nation? And how important is maritime security to Australia’s national security? This article draws together some facts that help inform considered responses to these questions. A maritime nation can be defined as “any nation which borders the sea and utilizes it for any of the following: commerce and transport, war, or, to define a territorial boundary for any maritime activity (activities using the sea to convey or produce

an end result)”. Australia very obviously fits this definition. How well Australians understand the sea and maritime matters and the extent to which Australia’s maritime interests are considered by policymakers is less apparent.

## Geography and the Natural Environment

Governments come and go and many other factors change. Geography and the natural environment however largely endure with issues like technological advances, the evolving nature of international and human affairs, and climate change affecting its relative importance over time. Australia is the world’s largest island; an island continent situated in and claiming a vast maritime domain. A trite statement some may say. Let us consider some facts:

- Australia’s total coastline length, including islands is almost 60,000 km or more precisely 59,736 km (35,877 km mainland, 23,859 km islands).
- Australia has significant, diverse and distant offshore island territories including Christmas and Cocos Islands; the islands of the Torres Strait and the Great Barrier Reef; Heard, McDonald and Macquarie Islands; and Lord Howe and Norfolk Islands.
- We claim jurisdiction over the third largest Exclusive Economic Zone (EEZ) in the world (after the US and France) with an area of 8,148,250 km<sup>2</sup>, which is greater than the Australian landmass of 7,692,024 km<sup>2</sup>. The EEZ figure excludes waters off the Australian Antarctic Territory (AAT). Were these to be included, the area of Australia’s EEZ would be around twice the continental landmass.
- Additionally, in April 2008 the United Nations Commission on the Limits of the Continental Shelf (CLCS) confirmed Australia’s jurisdiction over 2.55 million km<sup>2</sup> of extended continental shelf seabed beyond 200 nautical miles from the coast; an area equivalent to around one third of the Australian continental land mass.



- Further, Australia has responsibility for one of the largest maritime Search and Rescue Regions in the world, which covers over one-tenth of the earth's surface, being 52.8 million km<sup>2</sup> in area and extending for more than 1,800 nautical miles (3,300 km) into the Indian Ocean, west and north to maritime boundaries with Sri Lanka, Indonesia and Papua New Guinea, east to our maritime boundaries with the Solomon Islands and Fiji, and south to Antarctica.

While this summary highlights the extent of our jurisdictions it does not present an adequate picture of the nature of the domain, and the opportunities and responsibilities this presents. Diversity, regional interaction and internationally shared challenges are also key considerations. Australia's maritime domain extends from the Indian Ocean, rimmed by increasingly important global and regional powers like India and South Africa; borders archipelagic South East Asia that includes our largest neighbour, Indonesia and part of the vital trade routes to our major trading partners, Japan and China; borders the maritime dependent island states of the Southwest Pacific; and extends into the Southern Ocean down to Antarctica, so important to the world's environmental and ecological health.

In addition to the great distances and remoteness of much of the domain, extreme and varied environmental conditions present operational challenges. Climatic and oceanic conditions span an extraordinary spectrum from tropical, monsoonal and cyclonic through mid latitude temperate zones and the high latitude Antarctic convergence zone to Antarctic waters. The Antarctic convergence zone presents the harshest sea conditions on the planet with Heard and McDonald Islands in the "furious 50s" experiencing average maximum temperatures of three degrees, it snows for 70 per cent of the year, wind gusts of 210 km/h and waves of 17 metres have been recorded; while sea areas to the

peacetime circumstances through to the possibility of significant conflict.

## Trade, Shipping and the Economy

Australia's economy is profoundly dependent upon maritime trade; 99.9% of trade by volume and more than 75% by value travels by sea. In the year ending 2007 this amounted to more than 669 million tonnes of exports by sea, worth \$A141 billion, and more than 80 million tonnes of imports by sea, worth more than \$A138 billion.

Maritime trade is expanding globally. It now comprises approximately 90% of all trade and is a key factor in the global economic system. The United Nations Conference on Trade and Development (UNCTAD) *Review of Maritime Transport 2007* reported that for 2006, the volume of world merchandising trade grew at 8%, double the rate of the world economy; and the demand for maritime transport services increased by 5.5%.

In 2006, dry bulk cargoes comprised more than 60% of global shipments with Australia providing 13.3% of the world total. Australia ranked as the largest exporter in the world of iron ore (37.7% of the world total) and coal (32.3%), and the third largest exporter of grain (9.5%). World liquid natural gas (LNG) shipments grew 11.6% with Australia ranked as the fifth largest exporter.

The world merchant fleet is rapidly expanding to meet increasing demand. It grew by 8.6% during 2006 to be 1.04 billion deadweight tons (dwt). Greece, Japan, Germany and China along with several other nations are pursuing expansions and renewals of their fleets. Orders for new ships are increasing at a remarkable rate for all shipping markets. At

July 2007, 7,433 ships totalling 415.8 million dwt were on order, with South Korea, China and Japan the leading shipbuilding countries comprising 81.7% of the world order book.

Australia is the last of the top 35 countries listed by shipping ownership in the UNCTAD *Review*, with 85 registered vessels over 1,000 dwt (46 Australian flag and 39 foreign flag) and 53.37% of dwt operating under foreign flag. The Australian Fleet represents only 0.29% of the world total dwt yet Australian exports by volume comprise around 10% of the world total. Our exports of bulk goods are forecast to double over the next 10-15 years. A previous Minister for Transport described Australia as a "shipper, not a shipping nation", a surprising concession from a senior policy maker, given that in 2005 global freight costs represented 5.9% of the total value of world imports, equating to more than \$US 750 billion. The "shipping nations" are taking advantage of the opportunities presented,

while Australia, a major user continues to miss out on a share of this revenue.

Australia's economy along with that of major trading partners like China, Japan and the US, is enormously dependent upon seaborne trade. It is vital to our national interests that Australia is able to contribute, along with other trading nations, to the maritime security task of ensuring the continued flow of trade.



HMAS SUCCESS with Heard Island in the distance during a 2004 operation in the Southern Ocean looking for illegal fishing activities in Australia's EEZ. Given the recent increase in size of Australia's EEZ many more ships and patrols in these sorts of areas may be required for Australia's maritime security. (RAN)

north of Australia are subject to tropical cyclones plus extreme heat and humidity.

In a world that is hungry for resources, Australia's vast maritime domain presents opportunities, many of which are yet to be fully explored. It also presents obligations and responsibilities including asserting sovereign control and effective management. Australia needs the capability to provide for all aspects of maritime security across the total domain, from normal





The infamous North Korean owned ship *Pong Su* after being apprehended in Australian waters by a combined team from the NSW Police, Federal Police, Customs, Coastwatch and the RAN. *Pong Su* was delivering illegal drugs at selected points along the Australian coastline. More operations like this may be needed to ensure Australia's ocean's are not used for illegal activity. (RAN)

## Offshore Resources

There are many offshore resources being explored and exploited. Only two: energy and fish will be briefly considered here.

### Energy

World energy consumption is forecast to increase by more than two thirds over the three decades to 2030, with oil remaining the dominant energy source. Asia, particularly China and India, accounts for almost half of the projected increase in world oil demand. World natural gas consumption is projected to grow at 2.3% per annum, almost doubling by 2030, accounting for approximately one quarter of world energy consumption and displacing coal as the world's second most important energy source.

The offshore oil and gas industry is now a significant component of the global maritime sector and economy. This industry, with its vast investment in large fixed and floating platforms and vessels, in locations extending to the edge of continental shelves and beyond, presents a range of unique factors for international and national security regulation and enforcement.

Australia is a net importer of oil products, with very small domestic reserves, producing primarily light sweet crude. The reliance upon imported refined petroleum products presents a significant vulnerability. Australian natural gas is more significant. Although with less than 1% of world reserves, Australia represents 6% of world production, 10 % of the Asia-Pacific LNG market and is predicted to be the world's third largest exporter by 2010. Australia's major customers are Japan, South Korea and China. LNG shipments pass through the archipelagic waters of Southeast Asia primarily from the North West Shelf Venture (NWSV). In 2006, NWSV delivered 205 cargoes of LNG, including its 2,000<sup>th</sup> cargo since commencement of operations and its first cargo to the Guangdong terminal in southern China. Offshore LNG exports have grown to approximately \$A7 billion in 2007-08 and will increase to \$A10 billion per annum over the next few years.

Domestic energy needs in parts of Australia are also largely met by natural gas, with Western Australia heavily reliant upon gas piped overland from the North West Shelf and Victoria reliant upon gas from Bass Strait. The Joint Petroleum Development Area in the Timor Sea offers increased potential for natural gas production when fully operational.

### Fish

Fisheries are worth more than \$A2.2 billion directly to the Australian economy each year. However, this figure indicates only part of the emerging importance of fishing related interests to Australia over the next decade and beyond. Fisheries and fish stocks will come under ever greater pressure in our region due to population increases and economic growth in China, India and other Asian countries.

Global fish stocks are under major stress. There are authoritative predictions that stocks will be completely exhausted in many parts of the world's oceans in the very near term (within 5 years). Modest estimates suggest seven of the top 10 marine fish (30% of all marine production) are fully or over-exploited; 25% of stocks are in crisis (17% overexploited, 7% depleted and 1% recovering from depletion); 52% of stocks are fully exploited (fished at their maximum biological productivity level); 21% moderately exploited; and 3% of stocks are underexploited.

For Australia, this means that the incidence of Illegal, Unreported and Unregulated (IUU) fishing is likely to increase markedly, and move in to deeper and more distant ocean areas. Australian fisheries protection operations will need to increase commensurately to cover all areas within our EEZ plus contribute to those managed by the regional fisheries management organizations (RFMOs) in which Australia participates. The range and complexity of enforcement tasks will increase significantly.

From these two examples, energy and fish, it is clear that Australia must be able to exercise effective management of and provide security for offshore resource interests. This requirement will become more compelling in the future as the global pressure on resources increases.

## Human Factors

One critical element underlies geography, trade and shipping, and offshore resource statistics: people. Effective maritime nations require trained, skilled, experienced and motivated people working in the maritime sectors. The specialised nature of many of the maritime professions and trades mean that people largely need to be developed within the industry. One of the most prevalent concerns to the maritime industries in Australia and internationally is a looming shortage of people with maritime skills.



A USN Seahawk flies over a merchant ship leaving a busy US port. So much trade is carried by the sea that any interference of the global shipping trade will have ripple effects throughout the world. (USN)

The global merchant marine workforce comprises approximately 1.2 million seafarers. In 2005, there was an estimated officer shortage of 2% with the situation predicted to worsen to around a 6% shortfall by 2015 unless remedial action is taken. The officers are ageing and there are inadequate numbers of trained and experienced replacements in the pipeline. There are reports of competition becoming intense between the major shipping companies for qualified people in some specialised areas, like tanker operations.

In Australia, the situation is more pressing. The decline in the Australian fleet has meant a decline in the numbers of qualified seagoing officers and training opportunities. The nationwide ageing workforce and skills shortage, exacerbated by the mining boom, are likely to be contributing factors.

Qualified and experienced mariners provide the pool from which many other maritime related occupations draw their people. In Australia, the reduced seafarer pool is now impacting upon the availability of people to fill positions like marine pilots, surveyors, cargo planners, ship managers, maritime regulators and tug masters. The burgeoning offshore oil and gas sector also needs many people with seafarer skills and maritime training institutions require a continuing throughput of seafarer trainees to remain viable.

Australia's maritime sector human capacity is small by international standards and certainly so when contrasted to the vastness of our maritime domain, the importance of the national maritime security agendas and the challenges this presents. Our capacity to effectively deliver maritime security is vital and will inevitably be limited by the availability of skilled and experienced people. Some people considerations include:

- We have a small permanent Navy with approximately 12,000 people in uniform, and recruitment and retention are ongoing concerns.
- Our merchant marine workforce (qualified and training) is estimated to be approximately 6,500 people.
- Our fishing industry is small as are our marine science and oceanographic communities by comparable international standards and in relation to the size of the maritime domain.

The overall result for Australia is a dearth of people with maritime backgrounds. This affects Government departments and agencies charged with maritime policy development and implementing regulation and enforcement. Human resources should be a driving factor in designing maritime security management arrangements for Australia. Capacity building must be a key consideration in order to ensure Australia has sufficient appropriately skilled and motivated personnel to achieve effective maritime security.

## Maritime Culture

A less tangible aspect is the extent to which Australia has (and needs) a maritime culture. If Australia aspires to be a "maritime nation", and given the enduring importance of the sea to our national interests this should be the case, then fostering a national maritime culture is vital to our future. We need a significant core of Australians who develop a deep understanding of and knowledge about the sea. A fundamental way of achieving this is through experience gained by participation in a variety of occupations that derive their livelihoods from the sea.

We have not developed a pronounced maritime culture probably due in part to our history and partly because of our geography;



An RAN Seahawk about to land RAN personnel on a ship caught fishing illegally in Australia's EEZ in the Southern Ocean. Australia's maritime area of responsibility is vast, stretching from the freezing cold Antarctic to the tropical waters of Northern Australia. (RAN)

the latter because Australia is both an island and a continent. Our short history since European settlement included an early dependence upon the Royal Navy, followed by extended emphasise upon agriculture and mining plus the raising of significant land forces to fight in distant wars. Most Australians think of "the sea" as simply a place to go for holidays; some have suggested that "sea blindness" is a national disease.

The creation of a human development environment that will encourage involvement in the maritime sectors is an essential step toward developing a national maritime culture, which is also important to maritime security.

## So what for national security?

Despite globalisation, technological advances and the information revolution, geography remains an important factor and Australia has a vast maritime geography. Australia's national security, in its broadest and multifaceted sense, is largely dependent upon our capacity to effectively control and utilise the maritime domain. For Australia, border security is primarily maritime border security. Our wider region is also predominately maritime and a fundamentally maritime strategy must be central to our national defence.

In recent years a number of factors have combined to complicate maritime security challenges. Ongoing and increasing concerns include drugs and people smuggling, security of offshore resources, threats to marine bio security and the freedom and security of navigation. Other issues with maritime security dimensions include the possibility of regional pandemics and the impact of climate change on the oceans and our regional neighbours, including the prospect of rising sea-levels, increased natural disasters (from extreme weather events) and changing marine environment profiles.

While Australia demonstrably fits the "maritime nation" criteria in many respects, the facts suggest that we are an "incomplete maritime nation". Australian policymakers and Australians more broadly need to turn their concerted and coordinated gaze toward our oceans. This will become increasingly important to our national interests. In Australia's case, national security and maritime security are largely congruent.

1. See [http://en.wikipedia.org/wiki/Maritime\\_nation](http://en.wikipedia.org/wiki/Maritime_nation).



## Defence White Paper public consultation begins

The Minister for Defence, the Hon. Joel Fitzgibbon MP, has launched the Defence White Paper Community Consultation Program and released a public discussion paper 'Key Questions for Defence in the 21st Century' during an event at Parliament House.

"As a key component of this program, the public discussion paper will help us to generate ideas and expand the public debate about defence and security that is so essential to the White Paper process. The paper will inform and encourage discussion among interested members of the general public as well as the wider Defence community, and will also encourage consideration of the many facets of Defence business and more general Defence policy", the Minister said.

"The Community Consultation Program will include opportunities for public contribution during open meetings in major capital cities and key regional centres across the country.

"In addition to the community consultation activities, there will also be separate opportunities for dialogue between the panel and State and Territory politicians, industry representatives and Defence analysts and commentators."

During the event the Minister also announced the remaining members of the Community Consultation Panel who will manage the consultation program. Rear Admiral Simon Harrington (Rtd), Professor Tanya Monro and Mr Peter Collins will join Chair Mr Stephen Loosley and Deputy Chair Mr Arthur Sinodinos as members of the Defence White Paper Community Consultation Panel.

"Together, Rear Admiral Harrington, Professor Monro and Mr Collins will bring a wealth of experience to the program with professional backgrounds in the military, business, science, research, legal and political sectors" Mr Fitzgibbon said.

## Let your voice be heard

Readers of this edition of *THE NAVY* will find a wealth of information in a number of items and articles in our pages relating to the White Paper. They are aimed to assist those who wish

to address the Defence White Paper Community Consultation Panel. It is hoped that readers will make their informed opinions heard.

To help, the programme of meetings is reproduced below. The Defence Department's White Paper website ([www.defence.gov.au/whitepaper](http://www.defence.gov.au/whitepaper)) should be consulted before each meeting to ensure the venue has not changed.

### Date/Venue (all meetings are scheduled for a 6pm start)

8 July
Grand Ballroom
Crowne Plaza Darwin
32 Mitchell Street
Darwin
9 July
Gumtree Room
Alice Springs Resort
34 Strott Terrace
Alice Springs
16 July
Board Room
Westland Hotel
100 McDouall Stuart Avenue
Whyalla
17 July
VENUE TBC
Adelaide
21 July
Tabletop Room
Picnic Point
164 Tourist Road
Toowoomba
22 July
Boulevard Room
Rydges South Bank
Cnr Grey & Glenelg Streets
Brisbane
23 July
Raffles Room
Rydges Southbank Townsville
23 Palmer Street
Townsville
23 July
The Phillips Lounge
Rockhampton Leagues Club
Cambridge Street
Rockhampton
24 July
VENUE TBC
Cairns
24 July
Milton Gold Room
Southern Suburbs Football Club Inc
181 Milton Street
MacKay
29 July
Grand Ballroom 1
Hotel Grand Chancellor
1 Davey Street
Hobart

30 July
Launceston RSL & Citizens Club
313-315 Wellington Street
Launceston
6 August
Bradman Room
Manuka Oval
Canberra
27 August
VENUE TBC
Sydney
28 August
Jacaranda Room
Dubbo RSL Club Resort
Cnr Brisbane & Wingewarra Streets
Dubbo
28 August
Council Chambers & Committee Rooms
135 Rusden Street
Armidale
2 September
Gallipoli Room
Anzac House
Level 1, 28 St Georges Terrace
Perth
3 September
Abrolhos Room
Ocean Centre Hotel
Cnr Foreshore Drive & Cathedral Avenue
Geraldton
3 September
Chamber House
15 Stirling Street
Bunbury
4 September
VENUE TBC
Port Hedland
4 September
Eclipse Building
Western Australian Museum
Residency Road
Albany
9 September
Pacific Room
Quality Hotel NOAH's on the Beach
Cnr Shortland Esplanade & Zaara Street
Newcastle
10 September
VENUE TBC
Nowra
10 September
VENUE TBC
Wagga Wagga
11 September
Carlton Room
Chifley Albury
Cnr Dean & Elizabeth Streets Albury
11 September
Function Centre
Country Comfort Bathurst
Cnr Brilliant & Stewart Streets
Bathurst



15 September  
Recreation Room  
Geelong RSL  
50 Barwon Heads Road  
Geelong

16 September  
Swanston Hall  
Town Hall  
Cnr Swanston & Collins Streets  
Melbourne

17 September  
Bendigo Bank Theatre  
Bendigo Regional Arts Centre  
50 View Street  
Bendigo

17 September  
Victoria 1 Room  
Doherty Ballarat Hotel & Convention  
Centre  
613 Main Road  
Ballarat

## ERGM cancelled

The USN cancelled its Extended Range Guided Munitions (ERGM) programme on 24 March following firing trials in February, during which four out of five rounds missed the target.

The USN announced it would “cease funding Raytheon’s efforts” in developing the 127mm/5 inch rocket-assisted guided projectile just weeks after the trials at White Sands missile range in New Mexico.

It is understood that there were also problems with the operational reliability of the system with the project well behind schedule.

ERGM began life in 1996. Since then the USN has spent approximately USD\$350 million on ERGM. There was a programme re-start in 2006 when the contractor introduced 30 design changes. The tests during this February were supposed to indicate the success of these changes but only one in five rounds hit their targets. The five ERGM shots were fired at a target 75kms down range.

In December 2006 the US Government Audit Office criticised the ERGM programme because of technical problems that had caused an 11-year delay and urged the US Department of Defense to “conduct a comprehensive review of the programme”. Ten years earlier, the USN had estimated that development of the round would cost USD\$86 million; however, recent estimates put the cost at USD\$475 million.

The USN still has a requirement for sea-based fire support for ground troops in

littoral areas and will conduct an analysis of alternatives to find a replacement. The examination will include whatever other technologies and systems that are available.

One of those alternatives is the Alliant Techsystems 5-inch Ballistic Trajectory Extended Range Munition (BTERM) II. In trials at White Sands in the US during January, two unguided BTERM shots performed well but a third round failed.

## USN MH-60R Seahawk goes to sea

The USN’s newest multi-mission helicopter, the MH-60R Seahawk successfully completed its first at sea operation during January while underway in the guided missile destroyer, USS PREBLE (DDG-88).

While underway from 22-25 January off the West Coast of the United States, the helicopter accrued more than 23 flight



An MQ-8B Fire Scout Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle (VTUAV).

## Radar for MQ-8B Fire Scout

Radar will be incorporated onto Northrop Grumman Corporation’s MQ-8B Fire Scout Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle (VTUAV). The USN has decided to commit funds in 2009 to develop a radar capability on Fire Scout.

Northrop Grumman first demonstrated a radar capability on the RQ-8A Fire Scout in 2003 using a General Atomics



The USN’s newest multi-mission helicopter, the MH-60R Seahawk with dunking sonar being retrieved. (USN)

hours, 80 small-deck landings and 20 vertical replenishment evolutions.

The MH-60R Seahawk will be the cornerstone of the USN’s at sea helicopter fleet and will replace the legacy SH-60B and SH-60F aircraft.

The USN’s current plans call for more than 250 MH-60R aircraft. Sikorsky is said to be mounting an aggressive marketing campaign towards the RAN to replace the now cancelled Super Seasprite helicopter with the MH-60R.

Lynx Radar. That demonstration carried both radar and an electro-optical/infrared system. The same demonstration will take place on the MQ-8B Fire Scout this year on a company-owned Fire Scout using a non-developmental Telephonics RDR-1700B maritime surveillance and imaging radar.

The purpose of the demonstration is to show enhanced Fire Scout operational utility while confirming the assessment of a need for radar. Radar would not only benefit the US Navy, but would also be

beneficial to other services interested in Fire Scout.

## DCNS rolls out LE TERRIBLE



The new French SSBN LE TERRIBLE rolled out at DCNS's Cherbourg shipyard in France. (DCNS)

On 21 March, DCNS rolled out the new SSBN LE TERRIBLE, the fourth and last Le Triomphant-class nuclear-powered ballistic missile submarines at a ceremony attended by French President Nicolas Sarkozy. Over 3,000 people witnessed the rollout at DCNS's Cherbourg shipyard, the home of French submarine construction for over 100 years.

SSBN LE TERRIBLE is the fourth and last boat of the Le Triomphant class, which is progressively replacing the earlier Le Redoutable class. Like its predecessors, the LE TERRIBLE will be assigned to the French Navy's Strategic Ocean Force (FOST).

Construction of LE TERRIBLE began in 2000. It is the first to be equipped with the SAD M51 Submarine Launched Ballistic Missile. The other three Le Triomphant-class boats will be upgraded to carry M51 missiles as they come up for refit.

The French defence procurement agency (DGA) appointed DCNS as prime contractor for the SNLE-NG or new-generation SSBN program back in 1986. The development and construction of these naval assets has mobilised the resources not only of DCNS, the DGA and the French Navy but also those of the French atomic energy commission (CEA) and a host of industrial firms, laboratories and university departments. SSBN LE TERRIBLE will be fully fitted out and ready to serve with the Strategic Ocean Force in 2010.

### Technical data for SSBN LE TERRIBLE

Length overall: 138 metres

Diameter: 12.5 metres

Displacement, surface: 12,640 tonnes

Displacement, submerged: 14,300 tonnes  
Speed, submerged: > 25 knots

Complement: 111

Strategic weapons: 16 type M51 SLBMs

Tactical weapons for self-defence: torpedoes and SM-39 Exocet missiles.

## SM-2 Block IIIB tested

During combined combat system ship qualification trials, the USN's destroyer USS SAMPSON (DDG-102) flight tested four Raytheon built SM-2 Block IIIB missiles.

All missiles successfully engaged extremely stressing targets, which represented a variety of threat scenarios.

SM-2 Block IIIB is the latest variant of Standard Missile, adding an infrared seeker and other enhancements to the missile.

## US orders 167 V-22 Osprey

The Bell Boeing Program Office has been awarded a USD\$10.4 billion, five year Multi-Year Procurement (MYP) contract to deliver 167 V-22 Osprey tiltrotor aircraft. Bell Boeing is a strategic alliance between Bell Helicopter, a Textron Inc. company and The Boeing Company.



The 100th V-22 Osprey during an acceptance flight. (Bell)

The five-year contract includes 26 CV-22 aircraft for the US Air Force Special Operations Command (AFSOC) and 141 MV-22 aircraft for the US Marine Corps. The contract includes an option for additional aircraft. The Bell Boeing Program Office recently celebrated the production of the 100th V-22.

The V-22 is a tiltrotor aircraft with proprotors and engines installed in nacelles at the tips of both wings. With

the nacelles in the vertical position, the V-22 can take-off, hover and land like a helicopter. With the engine nacelles in the horizontal or forward position, the V-22 can fly at more than 300 mph with the long range of a fixed-wing turboprop airplane. Currently 12 Marine Corps MV-22 aircraft are conducting combat operations from Al Asad Air Base, in Iraq.

## Lockheed Martin opens P-3 Orion wing production line

Lockheed Martin opened its new P-3 Orion wing production line on 2 April, marking production kickoff at its Marietta, Georgia, facilities with a brief ceremony attended by Royal Norwegian Air Force (RNoAF) and Lockheed Martin officials. Norway is the initial P-3 Aircraft Service Life Extension Program (ASLEP) customer.

The RNoAF will receive six life extension kits, two conditional kits, and engineering support under the contract. Delivery of the first set of wings is scheduled for June 2009.

"The Government of Norway is pleased to observe the expanded production of wings for the P-3 Maritime Patrol Aircraft, which will extend the lifespan and improve the capabilities required to

support the operational requirement of Norwegian forces," said Col. Geir Wiik, Royal Norwegian Air Force.

Each life extension kit replaces the outer wings, centre wing lower surface assembly, horizontal stabilizer, wing and horizontal stabilizer leading edges and various fillet fairings. All necessary fatigue life limiting structures are replaced, allowing the RNoAF to operate its Orions for decades to come.

New alloys, which are five times less corrosive and will significantly reduce maintenance and sustainment costs, are employed in the manufacture of the new components. ASLEP is the only solution that removes all current flight restrictions on the P-3.

## Singapore fires first Aster

Singaporean Minister for Defence Teo Chee Hean witnessed the inaugural live firing of the Aster missile onboard the newly commissioned RSS INTREPID in Toulon, France, with the Chief of the Singaporean Navy RADM Chew Men Leong.

The Republic of Singapore Navy (RSN) Delta class frigates are equipped with the Aster Surface-to-Air Missile (SAM) system, which has a range of up to 30km. The successful live firing of the Aster missile marks a significant operational milestone. The RSS INTREPID, the second of six frigates, was commissioned into operational service on 5 Feb 08 (see *THE NAVY*, Vol.70 No.2 p18).



RSS INTREPID launching an Aster 15 anti-air missile.

## Block IV Tomahawk active in RN

The latest version of the Royal Navy's Tomahawk land attack missile (TLAM) has been declared operational - three months earlier than planned.

Used to arm submarines, the new Tomahawk Block IV missile is considerably more capable than its

predecessors. It has a significantly reduced response time and can fly further, striking land targets from the sea up to one thousand miles away with even greater precision. They are able to re-target or safely abort in flight and can relay images en route. The missile was first successfully test fired from a Royal Navy submarine last June.

The Tomahawk missiles can be carried by Trafalgar class attack submarines and will be deployed in the new Astute Class when they enter service. HMS TORBAY is the first submarine to be operationally equipped with them. HMS TORBAY, recently returned to the Fleet following a year-long £8M refit at HM Naval Base Clyde, Faslane, which has equipped her to be the most powerful boat in the fleet.

## Chinese frigate for Pakistan launched

The first of four F-22P frigates ordered by the Pakistani Navy from China three years ago has been launched from a Shanghai shipyard.

The deal marks the Pakistani Navy's first purchase of a major fighting unit from China. In the past, it procured such military hardware from Western countries including Britain and France. Pakistani Chief of Naval Staff Admiral Muhammad Afzal Tahir, who attended the launch ceremony, said the frigates will "form a very important component of the country's surface fleet".

As well as the four frigates, the deal includes the transfer of Chinese naval shipbuilding technology, as the last vessel is expected to be finished at a shipyard in Karachi, Pakistan in 2013.

## US Fourth Fleet reactivated

Chief of US Naval Operations Adm. Gary Roughead announced on 24 April the re-establishment of the US Fourth Fleet and assigned Rear Adm. Joseph D. Kernan, currently serving as commander, Naval Special Warfare Command, as its new commander. Fourth Fleet will be responsible for US Navy ships, aircraft and submarines operating in the Caribbean, and Central and South America.

US Fourth Fleet will be dual-hatted with the existing commander, US Naval Forces Southern Command (NAVSO), currently located in Mayport, Fla. US

Fourth Fleet has been re-established to address the increased role of maritime forces in the US Southern Command (SOUTHCOM) area of operations, and to demonstrate US commitment to regional partners.

Effective July 1, the command will have operational responsibility for US Navy assets assigned from east and West Coast fleets to operate in the SOUTHCOM area. As a result, US Fourth Fleet will not involve an increase in forces assigned in Mayport, Fla. These assets will conduct varying missions including a range of contingency operations, counter narcoterrorism, and theatre security cooperation (TSC) activities. TSC includes military-to-military interaction and bilateral training opportunities as well as humanitarian assistance and in-country partnerships.

US Fourth Fleet will retain responsibility as NAVSO, the Navy component command for SOUTHCOM. Its mission is to direct US naval forces operating in the Caribbean and Central and South American regions and interact with partner nation navies to shape the maritime environment.

Kernan will be the first Navy SEAL to serve as a numbered fleet commander.

## RAN sailors to get retention bonuses

The Minister for Defence Science and Personnel, the Hon. Warren Snowdon, has established a Navy Capability Allowance.

"The Navy Capability Allowance is aimed at retaining trained and experienced serving sailors" said Mr Snowdon.

The Allowance provides a financial incentive of \$24,000 to general service sailors and \$60,000 to submariners of Able Seaman through to Chief Petty Officer rank who agree to complete a further 18 months service.

"It is important that we provide key Navy personnel with a substantial incentive to remain in the Forces," said Mr Snowdon.

"And the Allowance forms part of a larger range of recruiting and retention initiatives being pursued by the Government to address workforce shortfalls within the Australian Defence Force."

More than 6000 sailors and 250 submariners will be able to benefit from this financial incentive.



## RAN AWD shopping list announced by US

The US Defense Security Cooperation Agency notified the US Congress of a possible Foreign Military Sale to Australia of AEGIS Combat System components as well as associated equipment and services. The total value, if all options are exercised, could be as high as USD\$450 million.

Australia requested a possible sale of the AEGIS Combat System and select combat system and communication components consisting of three AN/SPQ-9B Horizon Search Radars, three Cooperative Engagement Capability Systems, three Naval Fire Control Systems, three Multi-Functional Information Distribution Systems, AN/SLQ-25A Nixie Countermeasure Suite, Mk-160 Gun Computer System, AIMS Mk-XII Identification Friend or Foe (IFF) for the Air Warfare Destroyer platform, communication and information distribution systems, US Government and contractor engineering and logistics personnel services, personnel training and training equipment, support and test equipment, spare and repair parts, publications and technical documentation, and other related elements of logistics support.

## Final sunset for RSN's missile gunboats

On 13 May 2008, a sunset ceremony at Singapore's Changi Naval Base marked the closure of a significant chapter in the history of the Republic of Singapore

Navy (RSN), with the decommissioning of the RSN's Missile Gunboats (MGBs).

Commissioned in the mid-1970s, the MGBs heralded the RSN's entry into the missile age, by becoming the first ship in the region to successfully fire an anti-ship missile.

Since then, the MGBs have led developments in naval strike warfare and remained on the cutting-edge with continual upgrades to their weapons systems and sensors in the 1980s and 1990s.

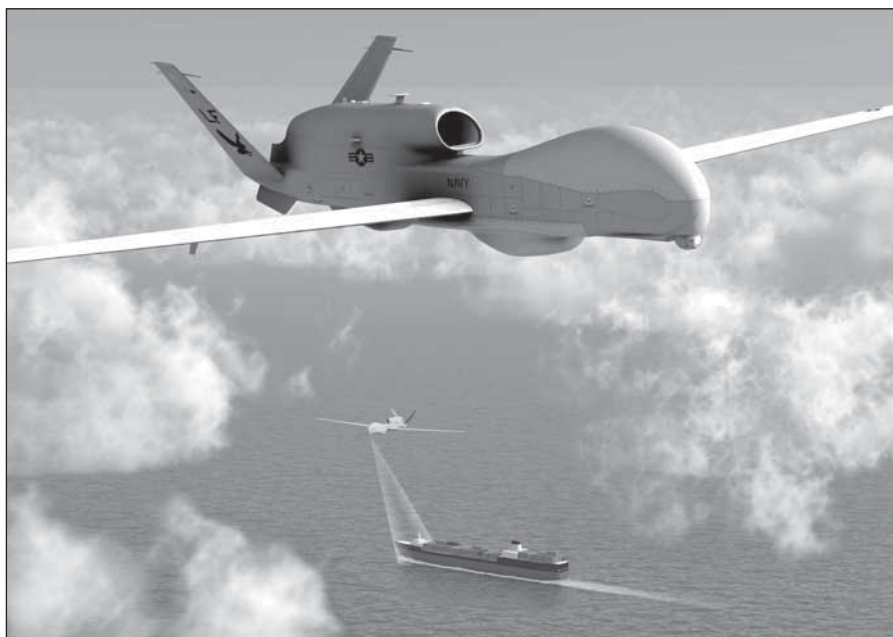
In a citation at the decommissioning ceremony, Fleet Commander Rear-Admiral (RADM) Ng Chee Peng praised the high operational readiness of the

MGB squadron.

Once the RSN's frontline fighter, the MGB was not without its quirks. An open bridge exposed navigators to the elements, while the passageways were so narrow that two sailors could only pass with their backs to the bulkheads.

## Global Hawk for USN (and ADF?)

The USN has awarded Northrop Grumman Corporation an 89 month, USD\$1.16 billion contract to begin system development and demonstration (SDD) of the service's new Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS UAS) program.



A computer generated image of the USN version of the RQ-4N BAMS UAS/Global Hawk. (Northrop Grumman)



One of the RSN's MGBs. All six have since been decommissioned. (RSN)

The BAMS UAS will provide the USN with a persistent maritime intelligence, surveillance and reconnaissance (ISR) system to protect the fleet and provide a capability to detect, track, classify, and identify maritime and littoral targets.

Northrop Grumman's RQ-4N, a marinized version of the RQ-4 Global Hawk unmanned air vehicle, will be the platform for the BAMS UAS suite of maritime surveillance sensors and communications systems.

The Northrop Grumman BAMS UAS is a multi-mission maritime ISR system that will support a variety of missions while operating independently or in direct collaboration with fleet assets. The RQ-4N will be able to provide a continuous on-station presence while conducting open-ocean and littoral surveillance

of targets. When operational, BAMS will play a key role in providing commanders with a persistent, reliable picture of surface threats, covering vast areas of open ocean and littoral regions, minimizing the need to utilize other manned assets to execute surveillance and reconnaissance tasks.

In addition to serving as the USN's BAMS prime contractor and unmanned aerial vehicle supplier, Northrop Grumman has developed the BAMS Multi-Function Active Sensor active electronically scanned array radar at its Norwalk, Conn., facility. Other RQ-4N BAMS team members include: Raytheon, which will support the Mission Control System segment and provide the electro-optical/infrared sensor; L-3 Communications, which will provide communications integration; Aurora Flight Sciences, which will provide the V-tail assembly and other composite structures; Rolls-Royce Corporation, which will provide the aircraft engine; Sierra Nevada Corporation, which will provide the Electronic Support Measures system; and Vought Aircraft Industries, which will supply the wing.

With the USN decision, Australia is expected to also announce the Global Hawk as the winner of its AIR 8000 Phase 1 project. Phase 1 of the project is aimed at acquiring a long range UAV to conduct maritime surveillance. Phase 2 is designed to replace the RAAF's P-3C Orion fleet.

## P-8 taking shape

US company Boeing recently joined the wing assembly and fuselage of the first P-8A Poseidon for the USN. The P-8 will replace the P-3C Orion in the maritime surveillance/ASW role for the USN.

Boeing Integrated Defense Systems (IDS) and Boeing Commercial Airplanes (BCA) are working together to build the P-8A, a military derivative of the 737-800, on a new final assembly line. The factory's third line takes advantage of the proven efficiencies, manufacturing processes and performance of the highly reliable Next-Generation 737.

The next major P-8A assembly milestone will be engine installation. The Boeing-led Poseidon industry team remains on track for delivery of the first test aircraft to the Navy in 2009. Under the current System Development and Demonstration contract, the team will build five test vehicles: three flight-test



The first P-8A Poseidon for the USN having its wing assembly attached to the fuselage. (Boeing)

and two ground-test aircraft.

The USN plans to purchase 108 P-8As to replace its fleet of P-3C aircraft. Initial operational capability is slated for 2013. The P-8A will provide increased capability in long-range anti-submarine warfare, anti-surface warfare, intelligence, surveillance and reconnaissance.

## Harpoon Block III a go

US Company Boeing has been awarded a USD\$73.7 million USN contract to design and develop the Harpoon Block III missile.

The system design and development (SDD) contract will result in a kit upgrade program for existing Navy weapons that will return 800 enhanced surface- and air-launch Harpoon missiles and 50 ship-launch systems to the USN's inventory.

Equipped with a new data-link system, Harpoon Block III will provide more control after the weapon is released, resulting in improved accuracy for littoral and open-ocean warfare. The Block III upgrade also positions the missile for future spiral developments, including extended range and vertical launch capabilities.

Harpoon Block III adds in-flight target updates, positive terminal control and connectivity with future network architectures to a proven missile that already provides autonomous, all-weather, over-the-horizon capability.

The surface-launch version of Harpoon

Block III will achieve initial operational capability (IOC) in early 2011 with IOC of the air-launch version scheduled for later that year.

## HMNZS ENDEAVOUR to be upgraded

The RNZN's 20-year-old tanker and supply ship HMNZS ENDEAVOUR is about to lose some of its fuel carrying capacity to bring it up to international standards.

The RNZN is spending about NZD\$2 million closing off some of the outer fuel tanks to effectively give the ship a double hull.

The tanker did not comply with International Maritime Organisation requirements because it had only a single hull. The RNZN said the IMO was accelerating its requirements for all tankers which carry petroleum based products to have a double hull.

The RNZN said it was modifying ENDEAVOUR so the outer tanks were filled with sea water rather than fuel oil. That would mean if the tanker was involved in a collision or grounding there was a greater chance of protecting the environment from damage from ruptured oil tanks.

Navy spokesman, Commander Keith Gilchrist, said the ship would lose about 10 percent of its cargo capacity.

"The way the navy is doing it is to decommission some of the wing tanks -- the ones closest to the water -- and converting those into ballast for the ship.

"If the ship was to have an accident it would be the water which falls out rather than the fuel."

The modifications would give the tanker another five years of service until the end of 2013 before it needed replacement.

The tanker was launched in 1988 in South Korea where it was built.

The tanker was a commercial tanker design but the RNZN added a replenishment at sea rig, military communications, the flight deck and helicopter hangar.

The ship was bought for NZD\$27 million when the RNZN operated Wasp helicopters but the navy's new Seasprite helicopters cannot land on it.

It was acquired because the warships the RNZN then operated -- the Leander class frigates -- had a limited range.

The shortfall in the frigates' endurance





The RNZN's 20-year-old tanker and supply ship HMNZS Endeavour. (RNZN)

was obvious in 1973 when Prime Minister Kirk ordered HMNZS OTAGO and HMNZS CANTERBURY to go to Mururoa Atoll to protest at the French Government's nuclear test programme. The ships were supported by the RAN tanker, HMAS SUPPLY.

Commander Gilchrist said the ship had been "very, very good value for money."

The RNZN has already begun looking for a replacement.

## WW II HM Ships EXETER and ENCOUNTER discovered

The wreck of HMS EXETER and the location of HMS ENCOUNTER, which both sank in 1942, have been discovered by a team of recreational divers in the Java Sea near Indonesia.

The Royal Navy's White Ensign now respectfully marks the final resting place of the two Royal Navy warships, the exact location of which has been a mystery since they went down following an encounter with a Japanese fleet off the coast of Indonesia in 1942.

54 officers and men perished in the sinking of the cruiser HMS EXETER and some 650 of the crew were made

prisoners of war by the Japanese, of whom 152 subsequently died in captivity. A further eight men from the destroyer HMS ENCOUNTER died in the contact and 149 were made prisoner, of whom 38 were to die as Prisoners Of War.

The wreck of HMS EXETER was found by a group of recreational divers. They initially discovered her in February 2007, but have only just been able to confirm her identity after revisiting the site and obtaining high definition images. HMS EXETER was part of a

squadron of American, British, Dutch and Australian warships. She sank on 1 March 1942 following an encounter with a numerically superior Japanese fleet in the Java Sea.

The destroyer HMS ENCOUNTER, whose location has also been found by the divers, together with the USS POPE, did their best to protect EXETER in the one-sided battle against the Japanese force. But eventually the stricken ENCOUNTER stopped and with three out of four guns inoperable, was ordered scuttled by her captain.

The USS POPE, having survived the sinking of the British ships, fought gallantly, expending all of her torpedoes and much of her ammunition, but she was subsequently attacked and sunk by Japanese divebombers. The wreck of the POPE has not yet been found.

## F-35B succeeds in STOVL Test

The shaft-driven lift fan propulsion system that will enable the Lockheed Martin F-35B Lightning II stealth fighter to perform short takeoffs and vertical landings (STOVL) operated for the first time in the production aircraft during ground testing on Sunday, May 25. At full power, the F-35B's system generates more than 40,000 pounds of lifting force, or about 170 percent more than current-generation STOVL fighters.

Pilot Graham Tomlinson of BAE Systems performed two conversions from conventional (wing-borne) to STOVL (jet-borne) mode with the aircraft



Ground testing of the shaft-driven lift fan propulsion system of the Lockheed Martin F-35B Lightning II stealth fighter. The F-35B's STOVL propulsion system operated exactly as expected. The F-35B begins STOVL-mode flights in early 2009.

anchored to a specially instrumented hover pit at Lockheed Martin's STOVL Operations Test Facility. The F-35B is conducting a final series of ground tests before its first flight in the coming weeks.

"The F-35B's STOVL propulsion system operated exactly as expected, providing the power output that our models forecast and transitioning very smoothly from conventional to STOVL-mode and back," said Bobby Williams, Lockheed Martin vice president and F-35 deputy program manager. "We expect the same kind of seamless transition when the F-35B begins STOVL-mode flights in early 2009."

The F-35B combines the profound advantages of stealth and supersonic speed with the ability to operate from small ships and austere bases near front lines.

The F-35B STOVL propulsion system has logged more than 1,900 hours of operation on test stands. In 2001 the X-35B, a proof-of-concept STOVL aircraft using a prototype of the same propulsion system, completed 14 short takeoffs, 17 vertical takeoffs and 27 vertical landings. On July 20, 2001, the X-35B became the first aircraft in history to perform a short takeoff, accelerate to supersonic speed in level flight and descend for a vertical landing in a single mission.

The STOVL propulsion system comprises a Pratt & Whitney F135 turbofan engine, a drive shaft leading from the engine face to a gear box and clutch connecting to a counter-rotating Rolls-Royce lift fan located directly behind the cockpit, a 3-bearing swivel duct at the rear that vectors the engine thrust downward and provides yaw control, and a roll nozzle under each wing for lateral stability.

During the conversion from conventional flight to STOVL flight, all doors associated with the STOVL propulsion system begin to open including the lift fan inlet and exhaust doors, the roll-nozzle doors, the auxiliary-inlet doors atop the fuselage (providing increased efficiency to the main engine) and the aft fuselage 3-bearing swivel duct doors. The 3-bearing swivel duct begins vectoring engine thrust downward as well. Once all doors are open, the clutch engages and the lift fan begins turning. As the lift fan reaches full speed the



PUKAKI, the third of the four Inshore Patrol Vessels being built in New Zealand by Tenix in Whangarei. She was launched in Whangarei on Tuesday 6 May. (Chris Sattler)

clutch locks, providing a direct physical connection between engine and lift fan. The aircraft control systems then begin using the STOVL propulsion system to provide aircraft flight control. The system operates automatically at the touch of a button.

The F-35B will operate in conventional mode during its initial series of flights to evaluate overall flying qualities and airworthiness. In preparation for the F-35B's first flight, pilot Tomlinson flew the F-35A for the first time on May 28, assessing the aircraft's handling at various power settings. In early 2009, the F-35B will conduct initial STOVL flight operations before moving to Naval Air Station Patuxent River, Md., for further testing.

The F-35 Lightning II is a supersonic, multi-role, 5th generation stealth fighter. The three F-35 variants are derived from a common design and use the same sustainment infrastructure worldwide to replace at least 13 types of aircraft for 11 nations, making the Lightning II the most cost-effective fighter programme in history.

### Third Project Protector vessel launched and named

PUKAKI, the third of the four Inshore Patrol Vessels being built entirely in New Zealand by Tenix in Whangarei, was launched in Whangarei on Tuesday 6 May. PUKAKI was formally named

on Saturday, 10 May, and with these words "I name this ship PUKAKI and may god bless her and all who sail in her", Launch Lady Mrs Alison Roxburgh cut the ribbon, releasing the champagne bottle on to PUKAKI's bow. The third Inshore Patrol Vessel is now one step closer to her delivery date.

This is another significant step in the introduction into the Navy of seven new ships under Project Protector. The first ship, the Multi-role Vessel, HMNZS CANTERBURY, was commissioned into the RNZN in June last year, the first Offshore Patrol Vessel, OTAGO, was launched in Williamstown, Victoria, in November 2006 with sister ship, WELLINGTON, launched in Williamstown in October 2007.

By the end of 2008 the RNZN's Protector Fleet will comprise seven ships of three different classes; one Multi Role Vessel (MRV), two Offshore Patrol Vessels (OPV) and four Inshore Patrol Vessels (IPV).

#### Specifications:

Displacement:	340 tonnes
Length overall:	55 metres
Beam:	9 metres
Speed:	25 knots
Range:	3,000 nautical miles
Complement:	
Core ship's company:	20
Government agencies:	4
Additional personnel:	12
Total:	36



# Observations

By Geoffrey Evans

## It's Time to Leave SYDNEY and KORMORAN in Peace

OBSERVATIONS in the October-December issue of *THE NAVY* questioned whether the cruiser SYDNEY, which vanished with her entire complement following an encounter with the German raider KORMORAN off the coast of Western Australia in November 1941, would ever be found; the answer came a few months later when in March 2008 the wreck of KORMORAN was located 112 nautical miles off the coast and soon afterwards, on 16th March, that of SYDNEY, both some one-and-a-half miles below the ocean surface.

The discovery naturally received considerable media attention and the search director, David Mearns, and his team received well-deserved praise for their achievement. The subsequent underwater photographs, particularly those of SYDNEY, were remarkable for their detail.

The meeting between the two ships in the afternoon of Wednesday 19th November and the action that followed have been described in a number of publications including World War II naval histories and from time to time have received attention in *THE NAVY*. As there were no survivors from SYDNEY accounts of the action have come from the over 300, including the Captain, who survived KORMORAN's sinking and were later recovered in small groups, some on the mainland near Carnarvon. There appears to be no reason to dismiss or discount the reliability of the accounts.

A great many ships, men-o-war and merchantmen, were sunk in World War II with heavy loss of life. Just six months prior to SYDNEY's disappearance HMS HOOD had been sunk by the German battleship BISMARCK with only three survivors from her complement of 95 officers and 1,324 men; BISMARCK herself was sunk three days later by Royal Navy ships with a reported 110 surviving. There were of course many witnesses to the destruction of these great ships but SYDNEY simply vanished from sight, thus becoming a mystery waiting to be solved for 67 years.

It will never be known why SYDNEY was in a position that enabled the raider to damage the cruiser so severely that she subsequently sank:

KORMORAN was also damaged and scuttled by her crew: There may be a very good reason but it will never be known. What could perhaps be explained by examining photographs of the wreckage is the probable cause of the ship sinking some 12 nm from the wreck of KORMORAN and out of sight of survivors of the engagement. The RAN should be able to do this without the need for more inquiries and then SYDNEY and her men should be left in peace.

## Maritime Responsibilities to Increase

The United Nations recently agreed to the addition of slightly more than 2.5 million square kilometres to Australia's area of seabed -jurisdiction, increasing the total area to some 10.7 million square kilometres - more than the mainland itself.

The area over which Australia has responsibilities is the third largest in the world, behind only those of the United States and France.

Clearly a great deal of no doubt costly research lies ahead if Australia and other nations are to benefit from such resources as may lie beneath the seas. The availability of appropriate maritime elements of the Defence Force to police the area must also be an important factor if responsibility is to be taken seriously.

## Our People

For some time Service leaders have been using the term 'our people' when referring to the activities of men and women under their command -rather like a proud father speaking of his family and hoping it will remain intact.

OBSERVER has noted the term has spread to other organisations in recent times, even to industry where hard-headed chairmen and CEOs refer to their employees as "our people" in what is no doubt meant to be a kindly way and hoping they will reciprocate.

Sadly, in the present day and age few families remain intact indefinitely and fewer companies, as members depart for greener fields or better prospects. This not to say they will not look back with nostalgia from time to time, but permanency is not a feature of modern life.



The front of the gun housing of "X" turret, credited by the Germans with inflicting the mortal blow on KORMORAN. ('The Finding Sydney Foundation')

# Super Hornet – The USN's Future

By CDR David Hobbs, MBE, RN (Rtd)



An 'F' model Super Hornet about to 'trap aboard'. The USN is currently accepting four Super Hornets per month and will do so until 2012. (USN)

**Australia's new Labor government threatened to cancel the order for 24 F/A-18F strike fighters shortly after its election but, having now completed a Review of the aircraft and the capability it will bring to the ADF, it has recently confirmed the order. Joel Fitzgibbon, the new Defence Minister, described it as "an excellent aircraft, capable of meeting any threat". Former RN pilot Commander David Hobbs takes a critical look at an aircraft that is arguably the most effective and affordable western fighter of its generation.**

## Origins of the 'Super Hornet'

In the 1990s the USN suffered the cancellation of a number of advanced strike-fighter projects such as the A-12, Navy Advanced Tactical Fighter and the A/F-X. Development of the F/A-18E/F second-generation or Super Hornet was seen at first as a stop-gap but as the expensive, stealthy projects disappeared it became central to the US Navy's re-equipment plans. Work on it began in 1992 as an enlarged development of the earlier F/A-18C/D Hornet, albeit with new engines, and the experience gained with the earlier type undoubtedly helped reduce the technical risk inherent in any new aircraft. Development was completed on time and under cost. This fact alone makes it unique and two subsequent Multi-Year Procurement (MYP) contracts have driven the procurement 'price-tag' down by a remarkable \$US1.7 billion. The latest aircraft, to Block II standard, are being delivered at a unit cost of about \$US40 million, about one third of the cost of the first Low Rate Initial Production (LRIP) aircraft in 1999. Lean production techniques and rigorous management discipline, both continually improved, have the potential to drive down cost even further if a third MYP is contracted after 2012. Besides the low price-tag, Boeing have consistently delivered aircraft early and 314 Super Hornets had been delivered by May 2007 of which 46% were up to three months early; 34% up to two months early and 17% one month early. The remaining 3% were delivered on time. The Super Hornet has been a model acquisition programme of which both the US Navy and Boeing can be justly proud.

After a peak of 48 aircraft delivered in 2004, Super Hornet production has settled at 42 a year, just under four per month and will continue at that rate under present contractual arrangements until 2012. The USN Super Hornet is not a single type but a 'family' of variants using common airframes and engines. The single-seat F/A-18E and two-seat F/A-18F have represented the total production to date but from 2008 the EA-18G is included within the 42 aircraft annual total with four aircraft in the first year, eight in the second and

20 from 2010 to 2012. Boeing's 'state-of-the-art' lean manufacturing facility allows both mixed model production and the timely insertion of improvements into successive Blocks of aircraft. Thus the three variants are built alongside each other and production of the fighter variants was able to move seamlessly from Block I to Block II. Refurbishment contracts are in place to bring the former up to the latest standard and the timing of the Australian order was astute as it allows a block of aircraft for the ADF to be established before any other export orders take up production capacity.

## What you get for the money

Boeing claims that the Super Hornet delivers advanced capability at an affordable price now. A look at the aircraft and its systems shows this statement to be no idle boast. The 'heart' of the aircraft is the system of open architecture mission computers, each with large bandwidth, high speed networking and High Order Language software connected by a high-speed fibre channel network and backed up by a digital solid state recorder. Joint, network-centric operation is made possible by Link-16 Multifunction Information Distribution System (MIDS) and a digital communications system capable of sending and receiving voice, data and still or moving images from warships, ground stations, other fighters and airborne surveillance/control aircraft. From Block II the cockpit systems in the 'F' variant can be worked independently if necessary to engage two separate targets using onboard and offboard sensor information that is fused and displayed on large colour displays that give excellent situational awareness. The two aircrew, pilot and weapons systems officer, have independent weapons release capability and the cockpits are optimised for Hands on Throttle and Stick (HOTAS) operation and night vision goggles. The RAAF is to buy the two-seat 'F' variant which has the better strike potential but slightly less internal fuel than single-seat 'E' variant.

Sensors are impressive and include the APG-79 Active





A Super Hornet refuelling another Super Hornet. With the retirement of the S-3 Viking from the USN the in-flight refuelling role has been taken over by the Super Hornet. Every Super Hornet is able to perform this role without modification other than fitting of a refuelling pod. (USN)

Electronically Scanned Array (AESA) Radar which out-ranges 'legacy' radars and operates simultaneously in air and ground tracking. Among its many features are 'track outside scan volume', search while track with selectable search volumes, cued search, electrical protection ('jam-while-scan'), Synthetic Aperture Radar (SAR) wide-area ground mapping, sea surface search, air-to-ground targeting, weapon support and many others. It may not need workshop maintenance in the life of the aircraft. The aircrews' Joint Helmet-Mounted Cueing System means that critical information is always in their field of view and weapons and sensors can be cued rapidly onto high angle, off-boresight targets on the ground and in the air. The integral camera gives 'real-world' video images with symbolgy which can be transmitted through Link-16. The aircraft can carry the SHARed Reconnaissance Pod (SHARP) which uses electro-optical and infra-red sensors by day or night to generate near real-time images which can be viewed on board or transmitted via Link 16. It also has the AN/AST-228 Advanced Tactical Forward Looking Infra-Red (ATFLIR) long-range, high-resolution sensor for positive target identification. Information from the AESA Radar, ATFLIR, JHMCS, MIDS and Recorder is 'fused' through Multi-Source Integration (MSI) software to give the aircrew optimal target information and situational awareness. Complementary systems include an ALR-67(V) radar warning receiver; ALQ-214 onboard jammer; ALE-47 countermeasures dispenser and an ALE-50 towed decoy. Digital communications are provided by an ARC-210 UHF/VHF secure-voice radio and the Accurate NAVigation System (ANAV) gives integrated GPS/INS information. An APX-111 IFF interrogator/transponder is fitted.

Around all this technology is a reliable, fifth generation strike-fighter which is surprisingly, in view of its lightweight fighter origins, both larger and heavier than its ancestor, the F-4 Phantom II. Like the Phantom, the Super Hornet is known affectionately by its operators as the 'Rhino'. The twin General Electric F414-GE-400 engines are efficient, reliable and feature a long time between overhaul. They have Full Authority Digital Engine Control (FADEC) allowing unrestricted throttle movement throughout the flight envelope. The 'E' variant has 14,950lb (6,780 kg) of internal fuel; the 'F' and 'G' variants slightly less at 14,008lb (6,354 kg). They can all carry up to 16,272lb (7,381 kg) of external weapons or fuel tanks on eleven external pylons. Super Hornets are capable of carrying air-to-air refuelling

pods and these have been procured by the RAAF as part of a package of measures to enhance mission effectiveness. With 30,000lb (13,600 kg) of fuel in a five tank configuration on start-up this gives a significant capability to accompany a strike force or extend a CAP on station. Weapons cleared for use include AIM-120 AMRAAM, AIM-9X Sidewinder, Harpoon, Maverick, AGM-88 HARM, GBU-10/24, GBU 12/16, Mk 82/83/84 bombs, JDAM, SLAM-ER, JSOW and Paveway LGBs. All are carried on underwing pylons except for AIM-120 which can also be carried semi-recessed under the fuselage and AIM-9X on the wing tips. The variety of stores combinations is extensive but might comprise four AIM-9 Sidewinders and eight AIM-120 AMRAAM for a fighter mission and two Sidewinders, two AMRAAM and seven JDAM for a strike mission.

### Electronic attack

The first EA-18G Growler electronic attack variant was delivered a month early and flew in 2006. Its Development and Demonstration Phase is progressing extremely well and Initial Operational Capability is expected in 2009, after which the type will replace the EA-6B in operational squadrons. The airframe is very similar to the E/F variants and retains the APG-79 AESA Radar, JHMCS, Link 16 MIDS and the ability to carry AIM-120 and AIM-9X for self defence. Different systems include ALQ-218(V)2 RF receivers to provide accurate emitter identification and selective jamming



An 'F' model Super Hornet. The Super Hornet is currently the only 4.5 generation fighter on the market that is available for sale. The RAAF is currently waiting on an order for 24 'F' model aircraft to replace the F-111. (USN)



The new EA-18G Growler Super Hornet. The Growler will replace the Grumman EA-6B Prowler in the electronic attack role. The airframe, engines and many internal systems are common to the Super Hornet thus providing savings in logistics support and training. Australia is said to be seriously looking at the Growler which can also act in the radar/SAM attack role with AGM-88 HARM missiles. (Boeing)

capability and ALQ-227(V)1 communications countermeasures set. Three ALQ-99 tactical jamming pods are carried on pylons and there is an Interference Cancellation System (INCANS) which allows aircraft UHF communications to continue during ALQ-99 jamming and significantly improves aircrew situational awareness. Another important addition is the Multi-mission Advanced tactical Terminal (MAT) which receives offboard sensor information via SATCOM. HARM is the weapon of choice for the lethal suppression of enemy air defences. The second part of Australia's Air Combat capability Review will examine its needs until 2045 and a follow-on deal to purchase E/A-18G Growlers would make a great deal of sense. The aircraft would be sustained with their F/A-18 counterparts and the potential for the lethal suppression of enemy defences must be an important aspect of future ADF operations. It is no secret that USN EA-6B Intruders, designed to neutralise enemy anti-aircraft missile systems are now being tasked in Iraq and Afghanistan to counter roadside bombs and monitor insurgent communications traffic. These are capabilities that the ADF must take on board if it is to play a full part in the contemporary battle-space and I would put a further order for six E/A-18Gs into the category marked 'essential'.

## Growth

Early Super Hornets could engage air-to-air or air-to-ground targets. Block II aircraft can engage multiple air-to-air and air-to-ground targets concurrently. Planned improvements by 2013 will allow faster response times, measured in seconds. The USN is delighted with the aircraft and is driving down its own costs by reducing the number of aircraft types embarked in carriers. By the end of this decade Super Hornets will have replaced four legacy types including the older F/A-18C/D; EA-6B; S-3B and F-14A/D. Some F/A-18C/D units will remain under present plans until they are replaced by the F-35C Joint Strike Fighter from 2018 although concerns about late JSF delivery have caused the USN to study extending the lives of its 'legacy' F/A-18C/D fleet from 6,000 to 10,000 flying hours per airframe. The USMC has not yet participated in the Super Hornet Programme and hopes to replace its F/A-18C/Ds with the F-35B STOVL variant to create an 'all STOVL' tactical air component but as delays in F-35 development mount and the projected cost of ownership increases, this may grow less likely. The USN believes that the Super Hornet will be the principal aircraft within its carrier air groups until 2030, sharing the decks with

E-2D Hawkeyes and SH-60R/S Seahawk helicopters and, from 2018, the F-35C JSF. By 2030 it expects to deploy 88 fast-jets to each carrier air wing, of which half will be Super Hornets and half F-35C JSF.

## But...

Even this short summary has shown that the Super Hornet is affordable, extremely capable and available in a shorter timescale than its potential rivals. It really does seem to deliver "tomorrow's capability today" but surely there is a down side? The Super Hornet is not a stealthy aircraft and with all its stores on underwing pylons it must be a significant radar target but I don't think this is a bad thing, indeed by specifying an aircraft it can afford to buy in some numbers I think the USN has been sensible. The ability of the EA-18G to suppress enemy air defences and the E/F to fight through to their targets compensates for the lack of stealth in my opinion. There is, in any case, the distinct possibility that hostile network enabled systems might negate the value of stealth over the next two decades, effectively wasting the billions of dollars that have been spent on it by the USAF. The F-22 might eventually

be a better aircraft but even the USAF cannot afford to buy it in the numbers it needs and today it lacks the multi-role capability of the Super Hornet. So do the Typhoon, Rafale and Gripen and as these types progress, they are still likely to lag behind the evolved F/A-18 which will continue to receive avionic improvements. The 'baseline' JSF due to enter service with the USN in ten years time will have the same capability that the F/A-18F has now.

## The RAAF order

The Super Hornet is an attractive aircraft to replace the RAAF's F-111 bombers, the more elderly of which entered service in 1973 after five years in storage while problems with the 'swing-wing' structure were resolved. There have been claims that an F-111 upgrade might represent a better package but these do not stand up to analysis. Take a second glance at the section I have headed 'What you get for the money' and imagine what it would cost to give a significant number of F-111s even a small part of that capability, to integrate the various components and to make the whole package work. Given the recent failure of the RAN's SH-2G(A) Super Seasprite Project to incorporate 'cutting-edge' new avionics into elderly airframes, does



Three 'F' model Super Hornets in flight. Despite being larger than the classic Hornet the Super Hornet is far stealthier. It also has a much longer range and a greater weapon payload. The Super Hornet's AESA radar enables it to conduct ground attack and air-air mission simultaneously with incredible accuracy, range and clarity. Its digital communications suite includes Link-16 with the ability to share radar image data with any one else. The aircraft also possess significant onboard countermeasures for defence against anti-aircraft missiles. It is easy to understand why the USN is relying on the Super Hornet for all its combat missions. (USN)





The USS RONALD REAGAN refuelling one of her escorts, the USS CHANCELLORVILLE. Note the flight deck is almost all Super Hornets. The USN is using the Super Hornet for all its combat roles until the arrival of the JSF, much like the RAAF's decision to purchase the Super Hornet until JSF deliveries begin. (USN)

anyone really want to take on a unique project like that in Australia with a small number of aircraft that no other nation operates? I would put money on such an upgrade costing more, taking longer and offering less capability than the F/A-18 F. At the end of it the ADF would have a small number of 40 year old aircraft that are both expensive to operate and divorced from wider operator input such as that enjoyed by the Super Hornet.

The order is logical and sensible but raises interesting questions for the Review of Air Capability since Australia is one of a number of countries that have expressed interest in the F-35 Joint Strike Fighter (JSF). The Super Hornet will give Australia the capability it wants a decade earlier than JSF, albeit without stealth. Low rate initial production (LRIP) F-35s have recently been ordered in the USA at a unit cost of just over \$US200 million each; if Lockheed Martin can drive down production costs as successfully as Boeing, this would reduce the unit price-tag for late-production blocks to about \$US70million at today's value. Early aircraft, acquired in the next decade would be considerably more than that. Is the JSF worth it or would more Super Hornets, taking advantage of continuing capability enhancements, represent better value? Several countries will be watching the Australian experience with interest over the next decade and one of them ought to be the UK where the blend of capability, affordability and commonality with the country's closest ally must appeal to any politician with a grain of common sense as the best aircraft to equip the two projected new aircraft carriers.

### Food for thought

The RAAF has not enjoyed a good track record in joint operations and has often taken an isolated and arrogant attitude towards the need for the tactical air elements critical to the performance of the other members of the ADF. I understand from a friend in the USN that RAAF pilots undergoing F/A-18 lead-in training are doing the full course including deck-landing qualification. It seems

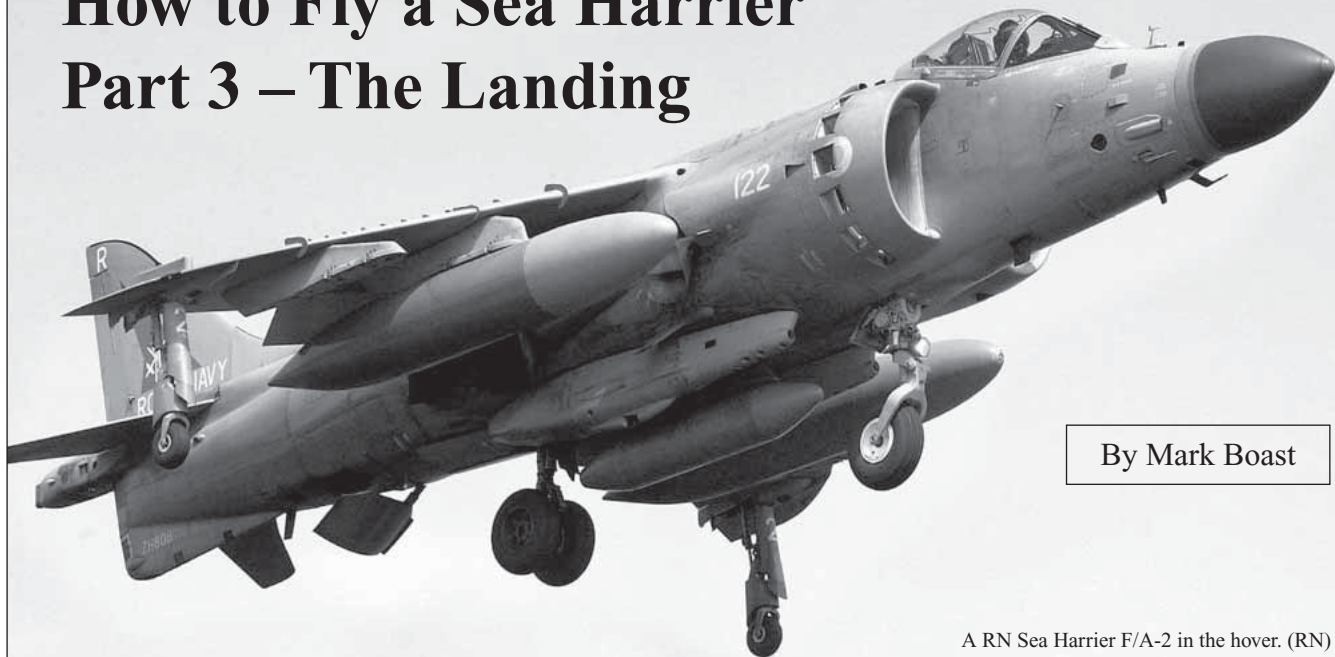
to me that this gives an opportunity that could lead to a refreshing new outlook on expeditionary warfare. In the 1950s the shore-based German Navy maintained aircraft that were capable of deploying to a NATO carrier if required. Perhaps now is the time for the RAAF to create a 'commando-style' force capable of deploying to an allied carrier as well as a forward operating base when needed. The RNZAF operated carrier-capable aircraft in 1945 and came close to embarking them in British carriers for operations off Japan. The idea is not new and should at least be considered to show that dogma is not limiting the capability of the ADF's new aircraft. The opportunity might also be taken to consider integrating RAN and Army pilots into F/A-18 units to improve their co-operation with other parts of the ADF. Hopefully the new Defence White Paper will take a refreshing new look at how the air elements of sea and land power are provided and will not be weighed down by inappropriate dogma.



An 'F' model Super Hornet about to trap aboard the USS HARRY S. TRUMAN. As part of its multi-role capabilities this particular Super Hornet is carrying a reconnaissance pod on the centreline pylon. An airborne reconnaissance capability is needed by the RAAF given the retirement of the RF-111 along with the F-111C aircraft. (USN)

# How to Fly a Sea Harrier

## Part 3 – The Landing



By Mark Boast

A RN Sea Harrier F/A-2 in the hover. (RN)

**Former RAN Skyhawk pilot and later Sea Harrier fighter pilot, Mark Boast, provides a first hand account of how to fly a Sea Harrier in this exclusive three part series in *THE NAVY*. In Part 3 Mark talks us through how to land a Sea Harrier.**

Harness tight and checks complete? Get ready with that left hand again, we're about to try out the many landing types and techniques of the Sea Harrier.

The first thing any astute observer will notice about any Sea Harrier landing is that regardless of speed, the attitude of the aircraft remains the same through the final approach and landing. An even more astute observer will see that it is only the nozzles that change angle. The reasons for this are both simple and subtle. The simple reason is that the unusual bicycle and outrigger undercarriage configuration doesn't tolerate flared landing and demands that any landing impact be taken via the main wheels and their very large shock absorbing oleo. The more subtle reasons are the predictable aerodynamic responses required for safe handling and a steady aircraft attitude to assist pilot situational awareness.

The Harrier wing was optimised for high speed and low level flying as part of the aircraft's original overland role. Therefore, vectored thrust via the rotatable nozzles was required to supplement or substitute for aerodynamic lift during normal landings. Intrinsic to the movement of the nozzles beyond the aft (pointing straight back) position is the automatic activation of the reaction control system (the "puffer" jets at the extremities of fuselage and wing) which were mechanically connected to the pilot's control stick or rudder pedals. These avoided the need for any special controls other than the nozzle control lever in the cockpit for control in jet borne flight.

The use of the Harrier's unique engine nozzle system as a fundamental flying control required a special training phase as its impact on aircraft handling was considerable and could not be replicated on any other training aircraft. To most pilots it was always a "new" control. This is what led to the "talk to the left hand" maxim that I have mentioned previously. The nozzle control lever was one that had not been inculcated in the fundamental flying skills taught in military flying training and needed some thought – especially as it was right next to the throttle.

Let's move on from these generalisations and look first at the land based landings, which include some interesting emergency approach variants. The first landing taught to a new Harrier pilot was the Fixed Nozzle Slow Landing. This involved progressively increasing the nozzle angle through 20 and 40 degrees and 65degrees during the circuit or straight in runway approach to slow from circuit to threshold speed. The throttle was progressively increased throughout this sequence and then used in the conventional manner through to touch down. At touch down (usually 140-150 knots) the rpm would be reduced to idle and the Powered Nozzle Braking technique employed.

The Powered Nozzle Braking technique was similar to that used by many commercial jets in that the engine thrust would be redirected to reduce speed after landing. This technique involved simply lifting the nozzle control lever past over the fixed Hover Stop and thereby pointing the nozzles forward. Increasing the engine rpm then achieved a very effective speed reduction without requiring brakes. The technique was used



Two RN Sea Harriers in the 'hover stop' position and about to move onto the ship. (RN)





One of the hard parts about landing the Sea Harrier on the deck of an Invincible class aircraft carrier is maintaining situational awareness of other parked aircraft and aircraft handlers on the deck. (RN)

until around fifty knots the nozzles needed to be moved to their aft position in order to avoid engine ingestion of nozzle efflux (and potential foreign objects) and normal wheel braking employed. The Harrier only had one brake system on the main wheels which was sufficient for lower speeds and taxi. The Powered Nozzle Braking technique was therefore not only useful, but also essential to avoid damaging the brakes.

The most common landing technique was the Fixed Throttle Slow Landing. This was flown using a fixed throttle setting and varying the nozzles to control the descent rate once the final approach speed was attained. The engine RPMs ranged from 70% up to 90% according to aircraft weight and landing purpose (normal or emergency). Whilst requiring a higher level of anticipation due to the slower aircraft response associated with nozzle movement when compared to throttle, the landing speed was optimised for aircraft weight. This baseline technique was applicable to the majority of emergencies such as engine surge, bird ingestion or low oil pressure as it “nursed” the engine by maintaining a steady rpm.

The next class of landings are collectively called Vertical Landings and were used both ashore and on the carrier. The range of touchdown speed was from fifty knots to zero although only the zero speed landing was used on the ship. The Vertical Landings with some groundspeed were designed for tactical landing strips or very constrained runways and designed to reduce potential foreign object damage inherent in the zero speed landing. The initial phase of the landing approach was similar to that for Slow Landings with progressive increase in nozzle angle and thrust to slow the aircraft until in the final phase when the nozzles were moved to a Hover Stop position (i.e. pointing straight down). The nozzles could be selected into a Braking Stop position (pointing slightly forward) to slow the aircraft as lift dependant drag reduced progressively below one hundred knots. The loss of lift was quite noticeable and engine thrust at 90 knots was similar to that required at zero airspeed.

The aim of the Rolling Vertical Landing was to achieve a minimum distance ground run consistent with avoiding the possibility of foreign object damage to the engine and aircraft inherent in the pure Vertical Landing. The desired fifty knot groundspeed (add the headwind component to get actual airspeed) was achieved by moving the nozzles slightly aft of the Hover Stop position. The remaining small amount of wing lift only added five hundred pounds to the “bring back” or

fuel/stores weight of the Sea Harrier and therefore had limited usefulness. The much larger wing and flap on the later Harrier II (AV-8B)/GR-7/9 exploited this area and quite significant “bring back” advantages could be gained. The STOVL JSF programme is also looking at utilizing this same technique for landing on large carrier decks in order to exploit the “bring back” increase to cater for expensive weapons and fuel loads that may be required when working with larger air groups.

The Creeping Vertical Landing was a very slow forward speed landing used in locations where a vertical landing was required, but FOD damage likely. By moving forward the aircraft would be clear of the majority of ground debris which would be blown behind the engine intakes. This technique was not required on FOD free flight decks and therefore was not employed on the small UK carriers where space usually precluded landing with any forward speed.

The pure Vertical Landing was set up by entering a stabilised hover over the touchdown point on land, or abeam the carrier landing spot (there were a number to choose from) at sea. The nozzles were left in the Hover Stop position for manoeuvring in the hover and the aircraft was either tilted in pitch and roll by the control stick, or rotated in yaw by use of the rudder pedals. To assist the pilot there were low authority autostabilisers for pitch and roll and a yaw stabiliser that primarily sought to avoid dangerous sideslip. A rudder pedal shaker also warned the pilot of high sideslip rates. A very useful device in the Sea Harrier that was not incorporated in other Harriers was the “nozzle nudge” facility that used the speed brake switch on top of the throttle to select the nozzles either ten degrees forward or aft. This useful tool enabled the pilot to move forwards or backwards without having to tilt the aircraft in the hover excessively and therefore complicate the situational awareness challenge. It also helped when matching the ship’s speed when hovering alongside.

A rate of descent was established by a slight reduction of thrust and a constant descent rate was maintained through to touchdown. At touchdown (and not before!) idle power was rapidly selected to avoid “bouncing” on the efflux that rapidly built up between the aircraft and the ground or deck surface, and the nozzles selected aft to avoid heating up the surface and engine exhaust. Whilst this technique sounds simple on paper, in practice it was moderately difficult due to the piloting tasks and situational awareness challenge of flying a pure vertical descent. Unlike a helicopter which is very responsive to control inputs in the hover, the Harrier has a sluggish response due to



An RAF GR-3 Harrier in the hover stop about to do a vertical landing. Note the nozzles are pointed straight down. (RAF)



An RAF GR-7 Harrier landing on HMS ARK ROYAL. The much larger wing area and more powerful engine of the GR-7/9 series of Harriers enable a greater 'bring back' load for the aircraft landing vertically. (RN)

its relatively high mass. The pilot also has very little downward vision and therefore has to rely on both fore/aft and lateral references that can be some distance from the landing point. For this reason it was often said by some that it was easier to land on the ship due to the easily seen visual references. On a calm day with no ship movement and no one else on the deck – maybe! But the very close proximity of superstructure, other aircraft, and above all, people, never induced an air of languor in my experience.

So why have I made so much about situational awareness? As in all naval aviation, success comes down to the ability to conduct embarked flying operations not only in good conditions, but also in poor weather and/or at night. The transition from instruments to a visual hover alongside a ship is very different from the transition for a conventional landing ashore. Whilst the ship itself provides potentially excellent visual cues of direction (ship centreline) and height (masts and superstructure), the sea conditions often cause the ship to heave, roll, and sometimes weave. As the Harrier's hovering characteristic was determined by its mass, it was very unwise to "chase" the ship's motion. As the thrust requirements were already very high, any unnecessary bleeding of compressor air to feed the reaction control system for control inputs, or extra demands by the throttle to climb and descend around a moving hover point, would use up the remaining thrust available. This could mean only one thing!

The answer was straightforward and largely relied on the Sea Harrier's very effective Head Up Display and reliable inertial attitude system. Pilots were taught to establish a stable hover at approximately 90ft (forty to fifty feet above deck height) above the water alongside the landing spot, transition laterally whilst maintaining altitude, stabilise in the hover about forty feet above the landing spot, and then descend vertically. No external commands were involved with the pilot making all decisions. Some coaching or advice was usually available from a duty pilot in the Flying Control position but usually reserved for initial deck qualification and emergencies. An abbreviated and informal flow of "patter" was used by an experienced pilot in Flying Control to assist those making night approaches as the ship's visual cues for establishing a visual hover didn't appear until quite late in the approach. Affirmation of a good final approach through closure rate ("fast, slow, looking good"), height above the water ("high, low, looking good"), and deck issues such as movement and landing spot availability were the most frequented topics.

The Sea Harrier always flew a common visual and

instrument straight in approach at night despite various attempts to devise a safe night visual circuit. The critical piloting task was to judge the point at which to commence the final deceleration to the hover. Too early and the aircraft could be left too far behind the ship with insufficient visual cues to maintain a safe hover. Too late and the aircraft would be ahead of the ship with no visual references whatsoever! This latter error was jocularly termed an "anchor inspection". In real life it was hardly jocular and if severe required a nerve wracking transition back to wing-borne flight for a very abbreviated second approach with minimum fuel. The final Hover Stop selection point was hard to reliably achieve from the curving/descending final approach of a visual circuit, so the best technique was to come straight in and take advantage of the relatively stable aircraft parameters to exploit information from the aircraft's own radar and range calls from the ship's approach radar controller.

To provide a solution to night and poor weather approaches, a unique approach system was installed on aircraft and carriers. Microwave Assisted Digital Guidance Equipment, or MADGE as it was called by its friendly acronym, was a digital range and azimuth finding system based on a ship based active antenna for aircraft interrogation and a passive angle measuring antenna. Aircraft were equipped with a complementary avionics including backup indicators on the conventional secondary flight instruments. Developed originally as a system for helicopter approaches in poor weather and night to tactical landing sights in the land environment, this system provided very accurate ILS like information including a very accurate range for deceleration cues. Additional benefits were the exchange of aircraft information such as Call-Sign, fuel weight, angle of attack and altitude to the Flying Control position. As far as most of us pilots were concerned, the other big benefit was that only the aircraft carrier had this system. Not that other warship in close company - or the Esso Madrid! You can guess the consequences, and they did happen before MADGE arrived.

Well, that's it for these articles on flying the Sea Harrier. I hope you have gained some insights into this particular pilot's eye view of this fascinating aircraft. Could I close with a tribute to all the operators and supporters of the Sea Harrier during its service in the RN Fleet, and that wonderful history of aircraft development that began all those years ago with the "Flying Bedstead". And of course the instructors who not only taught me and others how to fly the Sea Harrier, but also how to do it safely in order that I can write about it for you today.

**This three part series of articles are dedicated to the memory of Lt Cdrs Mike Auckland and "Jack" London.**



A new RAF/RN GR-9 Harrier. The RN and RAF jointly operate the GR-9 under the Joint Force Harrier Concept. The GR-9 has a significantly greater range, payload and electronic suite than the Sea Harrier it replaced. Its only drawback is that it has no long range radar for air-air missions. (RN)



## H.M.S. RODNEY

### *Warships of the Royal Navy*

By Iain Ballantyne

Pen & Sword Books Limited

Yorkshire, UK

[www.pen-and-sword.co.uk](http://www.pen-and-sword.co.uk)

ISBN 184415406-8

Hard Cover, 304 pages, B&W images

Reviewed by Steve Bennet

*HMS RODNEY* is Iain Ballantyne's fourth book and is one of the best researched, detailed and interesting accounts of any warship. The Royal Navy battleship *HMS RODNEY* was one of the most famous warships of the Second World War. *RODNEY* and sister ship *NELSON* were, at the beginning of the conflict, the most modern battleships Britain possessed. As such, Winston Churchill referred to them as the country's 'Captains of the Gate'.

This book tells *RODNEY*'s story, from her inception in the 1920s, through the notorious Invergordon Mutiny to her key roles in many crucial naval engagements. In May 1941 *RODNEY* turned *BISMARCK*, the pride of Hitler's navy, into twisted metal. She also participated in hard-fought Malta convoys, and supported the D-Day landings.

Through the eyewitness accounts of her sailors and marines the reader discovers what it was like to serve in a battleship at war.

The author used the *HMS RODNEY* Association to put out a call for help. A "superb response" was elicited from more than 150 letters sent to *HMS RODNEY* Association members throughout the UK and around the world. Their accounts aided the author in providing an accurate picture of life aboard this famous battleship. They included Tony Robinson, on loan from the RAN, who served in the battleship as a young midshipman during the final phase of the war in the Med and also the D-Day invasion. Tony, who today, aged 83, lives in Canberra, allowed the author to use extensive quotes from his excellent midshipman's journal, which helped inject the spice of sea-going life into the narrative.

Early in the research phase, ex-Royal Marine Jack Austin provided a richly detailed 21-page letter about his time in *RODNEY* during the Second World War, signing off from his home in NSW with the statement: "Iain, you have cost me a bloody fortune in tea bags and smokes but the memories were worth it."

Through the book we also learn of the many famous fighting admirals who served in, or commanded, *RODNEY*, including Admiral Sir Andrew Cunningham and Admiral Sir John Tovey. Cunningham's harsh management style is highlighted as a possible cause of mutinous conduct by her sailors, which led to *RODNEY* being unjustly branded 'The Red Ship'.

The stories of previous British warships to carry the name *RODNEY*, dating back to the 1750s, are also covered, including the vessel that took on the batteries at Sevastopol during the Crimean

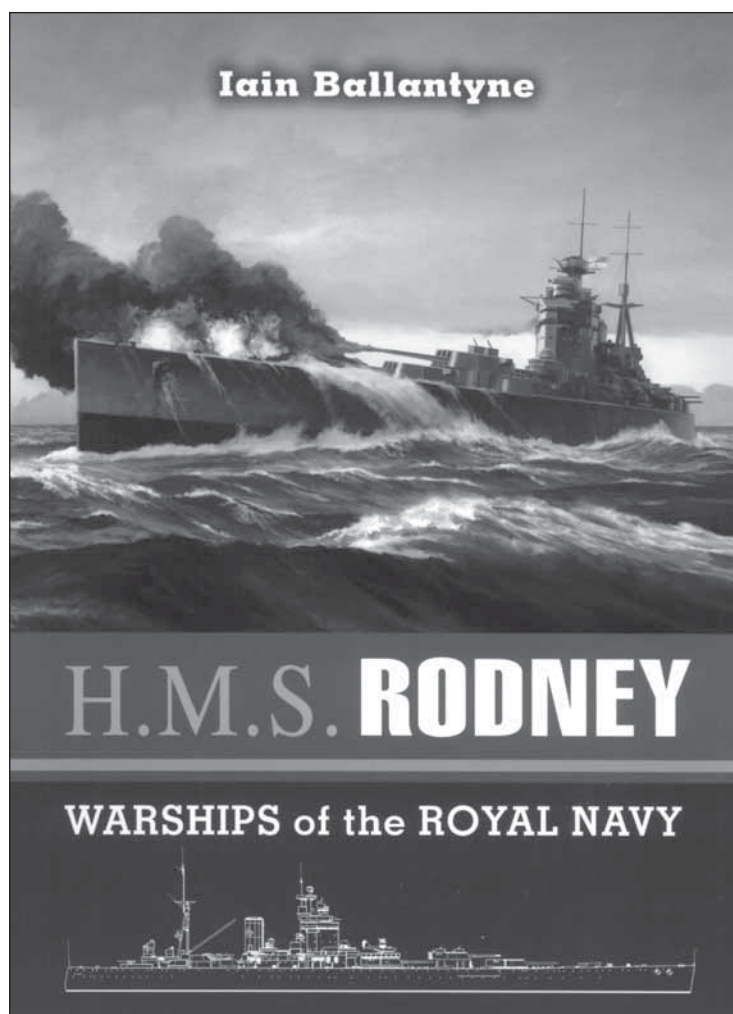
War. As well as presenting a fresh perspective on *BISMARCK*'s destruction, the author provides new insights into a bomb hit on *RODNEY* off Norway in 1940, which nearly made her the first British battleship lost to air attack. The book also contains an account of how a group of the battleship's sailors took part in the first ever British commando raid. *RODNEY*'s vital role, through her formidable naval gunfire support, in breaking the morale of Waffen SS divisions during the battle for Normandy, is covered, including the remarkable part played by code-breakers in directing the ship's guns. It also uses German records to highlight near misses that U-boats had made against *RODNEY*.

It all makes for an exciting, epic account of naval

warfare and the history of one of the great warships of the 20th century.

Iain himself said of the book "...this book was worth writing: To remind Britain of why the Navy remains its first line of defence; as a memorial to sailors and marines who readily risked their lives to defend the nation and its interests. If that sounds jingoistic, then, tough, for that is *RODNEY*'s story".

*HMS RODNEY* comes highly recommended and is a must for any library of naval warfare.



# STATEMENT of POLICY

Navy League of Australia

*For the maintenance of the Maritime wellbeing of the nation.*

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 the future reintegration of New Zealand as a full partner.
- Urges close relationships 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.
- Believes there must be a significant deterrent element in the ADF capable of powerful retaliation at considerable distances from Australia.
- Believes the ADF must have the capability to protect essential shipping at considerable distances from Australia, as well as in coastal waters.
- Supports the concept of a strong modern Air Force and a highly mobile well-equipped Army, capable of island and jungle warfare as well as the defence of Northern Australia and its role in combatting terrorism.
- Advocates that a proportion of the projected new fighters for the ADF be of the Short Take Off and Vertical Landing (STOVL) version to enable operation from suitable ships and minor airfields to support overseas deployments.
- Endorses the control of Coastal Surveillance by the defence force and the development of the capability for patrol and surveillance in severe sea states of the ocean areas all around the Australian coast and island territories, including the Southern Ocean.
- Advocates measures to foster a build-up of Australian-owned shipping to support the ADF and to ensure the carriage of essential cargoes in war.

As to the RAN, the League:

- Supports the concept of a Navy capable of effective action off both East and West coasts 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 decision to build at least 3 Air Warfare Destroyers (AWDs).
- Noting the increase in maritime power now taking place in our general area, advocates increasing the order for AWDs to at least 4 vessels.
- Advocates the acquisition of long-range precision missiles and long-range precision gunfire to increase the RAN's present limited power projection, support and deterrent capabilities.
- Welcomes the building of two large landing ships (LHDs) and supports the development of amphibious forces to enable assistance to be provided by sea as well as by air to island states in our area, to allies, and to our offshore territories.
- Advocates the early acquisition of integrated air power in the fleet to ensure that ADF deployments can be fully defended and supported by sea.
- Supports the acquisition of unmanned surface and sub-surface vessels and aircraft.
- Advocates that all warships be equipped with some form of defence against missiles.
- Advocates the future build-up of submarine strength to at least 8 vessels.
- Advocates a timely submarine replacement programme and that all forms of propulsion be examined with a view to selecting the most advantageous operationally.
- Supports continuing development of a balanced fleet including a mine-countermeasures force, a hydrographic/oceanographic element, a patrol boat force capable of operating in severe sea states, and adequate afloat support vessels.
- 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.
- Advocates the retention in a Reserve Fleet of Naval vessels of potential value in defence emergency.
- Supports the maintenance of a strong Naval Reserve to help crew vessels and aircraft and for specialised tasks in time of defence emergency.
- Supports the maintenance of a strong Australian Navy Cadets organisation.

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 aircraft carrier USS KITTY HAWK (CV-63). Sailors spell out sayonara on the flight deck as the ship departs Yokosuka, Japan's Truman Bay for the final time on May 28th before being replaced by USS GEORGE WASHINGTON (CVN-73). KITTY HAWK has been operating from Commander Fleet Activities Yokosuka since 1998 when she replaced USS INDEPENDENCE (CV-62). She was a frequent visitor to Sydney. (USN)



The former RAN frigate, HMAS CANBERRA, departs Fleet Base West for the last time under tow. She is to be used as dive wreck near Barwon Heads in Geelong, Victoria. (RAN)



A USN SH-60B Seahawk lands aboard the Republic of Singapore Navy guided-missile frigate RSS STEADFAST (FFG-70) during flight deck qualifications with the Republic of Singapore Navy. (USN)



The long awaited Austal trimaran contender for the USN's Littoral Combat Ship competition, INDEPENDENCE, seen here leaving her building shed before her launch. (Austal)