

# THE NAVY

The Magazine of the Navy League of Australia

*The UK Defence  
Review and  
The Royal Navy*

*The Last  
Gunfight  
Pt 2*

*The Airborne  
Surveillance  
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*Ship-Sinking  
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# THE NAVY

Volume 67 No. 1

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Front cover: The US Navy Arleigh Burke class destroyer  
USS GONZALES at sea. (USN)

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## FROM THE CROW'S NEST

### GOVERNMENT RETURNED

The result of the last Federal Election on October 9 had many in Defence breath a sigh of relief. Navy and Army, through extensive consultation, studies and experimentation, had worked hard on determining the requirements for ADF amphibious operations as outlined in the last White Paper. This body of work, done jointly, determined that the best way to meet the ADF's amphibious operations requirement was through the employment of two large helicopter carriers with a well dock for vehicles and a large ro-ro style ship for sea lift. Each of the two LHDs (Landing Helicopter Dock) would enable a lift of an army combined arms battalion team with all its vehicles, helicopters and logistics support. The ships would also provide full surgical, hospital and command and control facilities. Their utility to military operations and disaster relief cannot be overstated, as evident by the use of the LPA's KANIMBLA and MANOORA which the LHDs would replace.

Leading up the election the opposition Defence spokesman Kim Beazley hinted that the ADF's hard work on the Amphibious requirement may be inappropriate and that a new study and experimentation was needed. Visions of 1983 stared flashing through people's minds when the then Fraser Government was defeated by the Bob Hawke led Labor party who promptly cancelled the RAN's plans to replace its aircraft carrier HMAS MELBOURNE without consulting Navy.

The return of the Government has meant that four years worth of experimentation, hard work and tax payers expense has not been in vain with the Government giving no indication it believes reaffirmation of the future amphibious capability is necessary. It has even commissioned a study to cut costs and deliver the capability sooner.

*By Themistocles*

## FROM OUR READERS

### NAVY HERITAGE MUSEUM - REPLY

*Dear Editor,*

In the last edition of *THE NAVY* you printed a letter from the President – Victoria Division Navy League of Australia (CMDR John Wilkins RANR) who was “appalled” at a Naval Heritage Museum being located at Garden Island, Sydney. I would like the opportunity to respond to some of the views expressed by CMDR Wilkins and also inform your members as to the true nature of the RAN Heritage Centre (RANHC) Project.

The Project commenced with Navy undertaking Naval Heritage Management Study between 2001-2002. The purpose of this study was to evaluate Navy's overall management of its heritage and how best to exploit the Naval Heritage Collection (NHC) to support Navy goals. Among the Study's Terms of Reference was a direction to assess the need for a Heritage Centre and where such a Centre should be located.

RANHC site selection criteria reflected the Navy requirement for the Centre to support Navy Goals of internal ethos, recruiting, retention and public reputation, and not any State based preoccupation. Additional criteria included; sited on Navy (Defence) property, close access for Fleet units, accessibility for a large population, and cost (both construction and operating). Numerous Navy (Defence) sites were examined, including HMAS CERBERUS. Osborne House was not included in the selection process, as it is owned by the Geelong City Council and it did not meet many other criteria. Of all the sites examined the Public Access Area at Garden Island and its heritage listed Gun Mounting Workshop and Boatshed met all criteria. There was nothing “parochial” about the site selection apart from what was best for Navy.

CMDR Wilkins also argued to disperse the NHC amongst State based ‘campuses’ and for the ‘States’ to determine the distribution of the NHC. This view is the complete opposite of modern heritage management practise and Navy's responsibility under the Commonwealth Environment &

Heritage Act. It would be fair for your members to assume that Navy (who owns the NHC) is not about to hand over its heritage to State based institutions. Navy's heritage belongs to Navy and the nation and will be managed by Navy accordingly.

The NHC supports Navy capability and as Director I am responsible to the Chief of Navy through the Navy Systems Commander for the management and exhibition of Navy's moveable cultural heritage. The NHC is a single national entity with regional elements located at HMAS CRESWELL, HMAS CERBERUS and HMAS STIRLING as well as those items on loan to major public museums around the country. CMDR Wilkins might wish to know that I have already indicated my support to the Geelong City Council by offering to loan appropriate items from the NHC should they fund (as Navy will not) the Osborne House Naval Museum Project. The same holds true for the planned expansion of the Melbourne Shrine Navy exhibition in 2007.

Perhaps CMDR Wilkins was unaware that the NHC and RANHC are Navy assets, operated by Navy (supported by Defence) with Navy and Defence funds, before he accused senior Navy Command of “plain bloody-minded self-centredness”. I hope so.

I would also like to point out that, apart from CMDR Wilkins, the announcement of the RANHC has met with universal approval from Naval Associations, Navy League membership, the RSL, and other organisations around the country that have Navy's best interest at heart. When the RANHC opens in October 2005, the RAN will have a first class professional institution of national significance to display ALL aspects of a history for which we are justly proud. The question may well be asked as to where the “parochialism” really lies.

**S.R. Moore**

*Commander, RAN Director  
Naval Heritage Collection  
Locked Bag 12  
Pyrmont NSW 2009*

## JUST A THOUGHT

Dear Editor

With the planned paying off of the RAN Fremantle class one wonders what will happen to these veteran small ships? So far, two are programmed for spare parts to keep the remainder afloat till 2007.

May one suggest a suitable disposal policy for the remainder? Four to the RNZN as replacements for their aged inshore patrol boats. When NZ finally takes delivery of its new patrol boats the Fremantles would be returned to the RAN.

All remaining boats (including NZ returns) should then be offered equally to the Indonesian & Philippine Navies to assist with anti-piracy patrols in the Malacca Straits and the Sulu Sea for a token price including spares. Much like the highly successful Pacific Patrol Boat project.

Indonesia has the capacity to produce its own patrol boats and the Philippines are slowly purchasing unwanted US boats. But receipt of the Fremantles would upgrade their anti-piracy work far quicker than waiting for new equipment.

Leaving the main gun aboard would cause some headaches. No matter what is promised or written into any agreement both countries have 'insurgency' issues and would not be averse to using these weapons against their own citizens. But, to remove the gun would only indicate a sign of distrust by Australia.

There would also exist the possibility of future RAN patrols in conjunction with these two navies.

But, will it happen? Or will the hulls be sold off for conversions to private holiday cruisers?

Chris Cullinan (via e-mail)



One of the RAN's soon to be retired Fremantle class patrol boats.(RAN)

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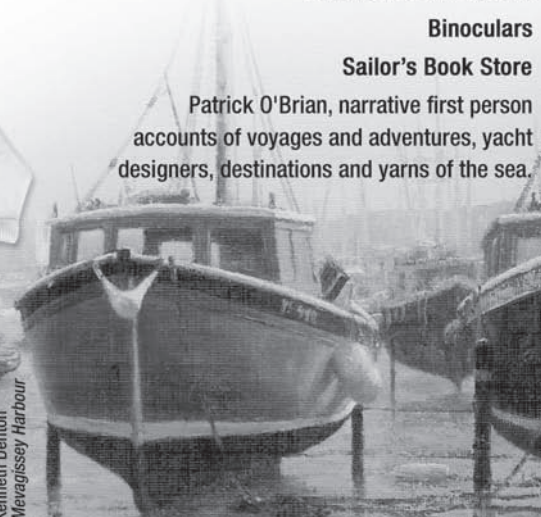
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# The UK Defence Review and The Royal Navy\*



By Dr Lee Willett\*\*

A computer generated image of the RN's new Type 45 Daring class of air warfare destroyer.  
The Type 45 programme will now be capped at eight hulls, as opposed to the originally planned 12. (BAE Systems)

## THE UK DEFENCE REVIEW PROCESS

Since 1998, under the UK Labour Government, the UK Ministry of Defence (MoD) has been undertaking an on-going review of defence policy, force structures and capability requirements. This defence review process has included the Strategic Defence Review (SDR) in 1998, the SDR New Chapter in 2002, the Defence White Paper 'Delivering Security in a Changing World' (published on 11 December 2003), and the Defence Command Paper 'Delivering Security in a Changing World' (published on 22 July 2004). This review process provides a model for force structures and capabilities to be transformed around flexible, rapidly deployable, networked forces able to respond swiftly to deliver a range of precise effects at the right place and time in a wide variety of expeditionary operations. To the UK Government, the process also has been vindicated in the light of developing threats to the UK and in the way in which the Armed Forces have been able to operate in recent combat operations.

Despite this, however, and despite a real increase in the defence budget, the process has seen an ongoing series of platform cuts culminating, in July of last year under the Defence Command Paper, in the most drastic cuts to all three services since the *Front Line First: Options for Change* review of 1993 (under the Conservative Government). Against a backdrop of a significant increase in operational tempo – which has, since 1998, included Operation DESERT FOX in Iraq in December 1998, the conflict in Kosovo in 1999, crises in Sierra Leone and East Timor, 9/11 and the War on Terrorism and the on-going conflicts in Afghanistan and Iraq – on the back of the 2003 Defence White Paper the Government felt it possible to make significant cuts to key RN assets.

- Attack submarines – the numbers have been reduced to eight.<sup>1</sup> With the MoD planning to keep only four of the existing *Trafalgar*-class SSNs, with only three of the new *Astute*-class SSNs currently on order and with the MoD not committed to any more at this stage, there is a danger that the number may fall as low as seven
- Destroyers and frigates – the escort flotilla will be reduced from 31 to 25, with the retirement of three Type 42 Batch 1 destroyers and three Type 23 frigates. The Type 45 *Daring*-class destroyer programme will also be capped at eight hulls, as opposed to the originally planned 12

## LESSONS IDENTIFIED FROM RECENT OPERATIONS

The recent White Paper highlighted the significance of integrated, versatile and flexible maritime forces operating at distance for providing access, delivering effect ashore through power projection and through inserting and supporting forces, and protecting lines of communication and supply. The UK Defence Minister, Mr Hoon, stated "our emphasis in the maritime environment is increasingly on delivering effect from the sea onto the land, supporting forces ashore and on securing access to the theatre of operation."

Recent operations also have underscored the flexibility of maritime power *per se* and of individual platforms themselves. Maritime platforms were able to deliver decisive effect across the spectrum of defence tasks, from forward-deployed surface ships displaying maritime presence and delivering naval fire support ashore, to aircraft carriers launching helicopter-borne troops in spearhead assaults, to SSNs bringing coercive and warfighting effect through precise, pre-emptive power projection, to logistics and support ships

supporting forces ashore and assisting in post-conflict reconstruction and humanitarian support.

Such operations have been notable from the maritime perspective for three main reasons. First, coalition maritime forces provided access into theatre from sea-based, sovereign platforms, often there were significant complications with host nation support in either geo-strategic or political terms. Second, coalition maritime forces have provided access onto target from international waters in the form of power projection ashore from distance, and, in Kosovo and Afghanistan, into land-locked countries. Third, maritime forces were able to deliver effect in the crucial early phases of a crisis, whether to deliver coercive effect or to act as an enabling agent in shaping the battlespace for follow-on forces. The UK MoD report *Operations in Iraq: Lessons for the Future* noted that “the operation confirmed the strategic value of the sea for the application of combat power, theatre entry and power projection in the form of sea-based helicopters, submarine-launched cruise missiles, amphibious forces and naval fire support.”

Taking the UK SSN-based *Tomahawk* capability as an example of the unique and enduring contribution of maritime power, in Kosovo and Afghanistan at least, on occasion it was quicker to put a *Tomahawk* over target than it was an aircraft. In all three operations, *Tomahawk* was often the *only* weapon used, supplanting air power on occasions of absence of host nation support, poor weather, of political sensitivities over targets, of risk of collateral damage and of risk to aircraft or aircrew. At times, *Tomahawk* was the only UK weapon available. In Iraq, due to some political problems with overflight rights, the UK *Tomahawk* shooters in the Gulf occasionally became increasingly important strike assets. In Iraq, however, *Tomahawk* also underscored its ability to work in tandem with air capabilities, with *Tomahawk* and the RAF *Storm Shadow* cruise missile occasionally working in a ‘left jab, right hook’ combination with *Tomahawk* degrading air defences, allowing aircraft-borne *Storm Shadow* to deliver repeatability and weight of fire.

Armed forces are transforming the way they fight, seeking to link sensors, decision-makers, platforms and weapons into a networked combat force for delivering this effect as, when and where required. The White Paper highlighted the UK’s emphasis on network-enabled capability and operations. For the UK, Network-Enabled Capability (NEC), the underpinning philosophy and the principal term used to describe concepts and capabilities which support the use and exploitation of information, is built around three main equipment pillars: sensors (to gather information); a network (to fuse, communicate and exploit the information); and strike assets (to deliver military and political effect). As Iraq showed, the network is robust and effective, even if somewhat embryonic, enabling US *Tomahawks* to be used in the intelligence-led snapshot strike, the night prior the planned start of the campaign, against a target thought to contain the senior Iraqi leadership. Moreover, key maritime capabilities such as the Block IV *Tactical Tomahawk* and the Joint Strike Fighter (JSF) – or Joint Combat Aircraft (JCA), as it is known in the UK – will be core elements in the overall UK NEC.

However, as shown in Iraq – where the limited numbers of *Tomahawk*-capable SSNs on station and the limited number of escort platforms with no long-range land attack capability meaning that 16 out of 19 RN platforms had no force projection capability – recent operations have highlighted the UK’s ability to make only a limited contribution to power projection operations.

## PROGRAMME UPDATE

In the summer of 2003, Mr Hoon spoke of the need to maximize the UK’s investment in and benefit from the three key programmes – the future carrier, the *Astute*-class SSN and the *Daring*-Class Type 45 Destroyer – which will form the backbone of the RN’s contribution to coalition, expeditionary operations. However, while the government re-affirmed its commitment to these programmes and its emphasis on maximizing flexibility and capability for land attack operations in particular, at a time of increasing operational tempo and on-going platform cuts, the CVF programme remains in an extended assessment phase, the government has yet to commit to buying more than three *Astutes*, number of Type 45s has been cut from 12 to eight, and no specific capability enhancements – notably *Tactical Tomahawk* for the Type 45 – have been sanctioned to soften the blows of the cuts. These capability decisions will have significant implications for the RN’s ability to project power from the sea.

## THE FUTURE CARRIER

SDR committed the UK Armed Forces to an expeditionary military strategy to support UK defence interests. In the short term, this capability will be delivered by upgraded *Harrier* GR-9s from Joint Force *Harrier*, operating from the UK’s three existing carriers, HMS ARK ROYAL, HMS ILLUSTRIOUS and HMS INVINCIBLE. In the longer term, key components of this strategy are the two new aircraft carriers (CVF), to be named HMS QUEEN ELIZABETH and HMS PRINCE OF WALES. The UK MoD has committed to this programme and, with the MoD now allied with industry in an extended assessment phase.

CVF is not a fleet defence asset, but is a joint, enabling asset for air power and for joint operations ashore. CVF will be the principal platform for the RN/RAF JCA, the short take off vertical landing (STOVL) version of the F-35 Joint Strike Fighter. Along with the Type 45 air defence destroyer, JSF will represent the Fleet’s air defence cover. However, JSF predominantly is a strike aircraft, and will be a central component in the RN’s power projection network. The White Paper highlighted the flexibility and multi-role capability of JSF, stating that the aircraft will offer a “step change in [the UK’s] ability to project air power from the sea”.

The JSF STOVL variant is scheduled for 2012. To



The Invincible class carrier HMS ARK ROYAL at Malta. The two new and much larger aircraft carrier replacements, HMS QUEEN ELIZABETH and HMS PRINCE OF WALES, will not be in service until 2012 and 2015 respectively. (RN)

maximise CVF's flexibility, the hulls are being built to an adaptable design which may allow different JSF variants to be operated in the future. The two ships are scheduled for deployment in 2012 and 2015 respectively with an estimated cost of around £3bn, a time and cost delivery framework which, the MoD says, will not be affected by the current, extended assessment phase. This on-going assessment phase, aimed at ensuring a fully de-risked programme, means that confirmation of the performance, cost and time parameters for the ship is not now expected until 2005.

## THE ASTUTE-CLASS SSN

The RN's Submarine Flotilla provides the UK's long-range conventional strike capability as well as the national strategic deterrent. The SSN's future is assured because of its enduring, multi-purpose flexibility.

The UK's next generation SSN, the *Astute*-class, is designed for both blue and littoral water operations, offering significantly enhanced capabilities for the SSN Flotilla through an array of state-of-the-art weapons, communication and sensor systems. It is tasked primarily with the traditional SSN roles of supporting the *Vanguard*-Class *Trident* submarines, Anti-Submarine and Anti-Surface Ship Warfare and surveillance and intelligence gathering, and task group operations. The major improvements include: a 50% greater weapons load-out capacity (with up to 38 weapons available for firing from six tubes)<sup>2</sup>; the fitting of the *Spearfish* torpedo; and communications and sensor suite which will include the Submarine Command System (SMCS) and a tactical data link to enable communications with joint planning staffs, the 2076 sonar, and the Recoverable Tethered Optical Fibre (RTOF) sonar buoy.

However, as *Astute* will be a prime platform for the RN's integrated power projection capability, added to this list as primary tasks are a much greater emphasis on special forces and land attack operations. For special forces insertion, *Astute* will be fitted with a Dry Deck Shelter.<sup>3</sup> For land attack purposes, *Astute* – with the UK *Tomahawk* capability currently assigned to SSNs only – is a prime platform for the UK's long-range power projection capability, with land attack a key user requirement. The integration from build of the torpedo-tube launched *TacTom*, which will be available to the UK from 2007, along with the Tactical *Tomahawk* Weapons Control

System (TTWCS) is perhaps the most significant development.<sup>4</sup>

The *Astute* programme is building in considerable design flexibility and modularity to allow adaptations, modifications and upgrading of capabilities as new technologies emerge throughout the life of the class. For *Astute* and future submarine developments, the MoD and industry also are striving to identify the best solutions in war-fighting and cost effectiveness to fill carefully analysed gaps in a capability-centred approach, focusing on the greater integration of underwater assets with wider maritime, air and land assets to improve overall the submarine's contribution to the defence mission. The MoD has committed already to buy three *Astute* boats. The build programme is well under way, with steel cut on the first two hulls of the class and with the first boat scheduled for formal delivery to the MoD in 2008.<sup>5</sup> The MoD is not yet at the point where it must make a decision on how many more of the class it will procure. The next phase of the programme should see a decision on buying between one and three more hulls, a decision which will be driven by an incremental and evolutionary acquisition and build approach driven itself by prevailing capability requirements and affordability.

A larger payload will be crucial to the SSN's ability to continue to influence events ashore. If a larger weapons-carrying capacity for SSNs is required, one question is the benefit of installing other launchers – such as a VLS system – to augment the weapons-carrying flexibility (as well as capacity) of the platform in later hulls of the class.

## THE TYPE 45 DARING-CLASS DESTROYER

With *Tomahawk* fitted to UK SSNs, a potential adversary would have to consider in his strategic calculations that there *could* be a *Tomahawk*-capable British SSN patrolling offshore. UK escort ships do not have a long-range land attack capability and, thus, do not carry the same weight of political and military influence and can make only a limited contribution to coalition operations ashore. Escort platforms have a vital role to play in crisis management and power projection. They represent maritime power in its purest form – presence. However, the escort flotilla, traditionally distinctly 'naval' in its role, now faces the challenge of making a broader and more flexible contribution to joint operations and, particularly (and as with all assets), to operations ashore.

A Type 45 with an air defence capability but fitted also *for* or *with* a range of flexible options – such as a flexible launcher like the Mk-41 which could carry systems like a potent long-range land attack cruise missile capability such as *TacTom*, and, perhaps, a five-inch (with Extended Range Guided Munitions) or even a six-inch gun – would significantly improve the capabilities of the platform. It would improve the ability of the platform to: deliver access both into theatre and onto target; make a more significant political and military contribution to the coalition operations; provide significant political and military coercive effect through visibility and through the ability to deliver effect ashore at the place and time of choice; to swing between roles across the entire spectrum of combat operations; to maximize the utility of the already-existing platform across the spectrum of operations and across all phases of combat. As the requirement for delivering strike capability ashore increases, the need is for more – not less – surface platforms. Moreover, if escort numbers are going to be cut, it makes sense to maximize their capability and flexibility to give the flotilla (in the words of Mr Hoon) "greater



The Trafalgar class submarine HMS TRIUMPH and the Type 23 class frigate HMS NORTHUMBERLAND operating together at sea. Four Trafalgars will remain in service when the new Astute class SSN reaches the fleet, giving the RN only eight SSNs. Also under the new review three Type 23 frigates will be decommissioned. (RN)



flexibility and capability to project power on shore” at a time when surface platform numbers are under threat. First Sea Lord Admiral Sir Alan West stated that “it makes absolute sense to get a land attack capability into these ships.”

However, with the Type 45 designated as an Anti-Air Warfare platform and with a capability to service land targets only through naval fire support, there is no requirement yet for the Type 45 to be fitted with a long-range land attack capability. Fitting a long-range land attack capability to the Type 45 has been a subject of significant debate in the UK throughout the most recent chapters of the defence review process. *TacTom* (which has successfully completed eight test firings out of eight) is available at the most cost-effective price (\$US 1.3 million, including the round itself and all associated infrastructure costs) to the UK this year, as part of the US Navy’s own multi-buy of *TacTom* rounds. Indeed, after the multibuy window closes the risk is that the unit price will increase. The costs of a Mk-41 launcher (whether brand new or second hand) will be relatively small in the context of the overall through-life cost of the Type 45 programme. In terms of a long-range land attack capability, the other competing launcher/missile package is the French-made *Sylver A70/Scalp Naval* combination: at this stage, however, both systems are in development only, and little is confirmed about their capabilities, costs and in-service dates.

Perhaps the key component in this debate is the window of opportunity for fitting the Type 45 to receive such a capability.<sup>6</sup> As with the carrier and *Astute*, in meeting MoD equipment capability parameters for potential for design growth and flexibility, there is space and weight design provision to allow the hull to grow. Thus, fitting a more flexible, strike-length launcher – either in the existing launcher space, or in the forward spaces (along with a five-inch gun) – in the fourth ship onwards is an option.<sup>7</sup> The window of opportunity gives the MoD options to integrate significant flexibility into the hull from build, to fit ships *for* (if not *with*) such a capability to provide the capacity for capability upgrades and batch growth throughout the life of the ship, to move the RN away from expensive, single mission ships, to augment the UK’s status and sustainable coercive presence at both a theatre and a global level, and to increase the platform’s (as well as the RN’s) overall warfighting capability.

However, the window of opportunity to fit ships 04 to 06 – batch two of the Type 45 class – with this capability closes in early 2005: *TacTom* and Mk-41 Baseline 7 are proven and available. Yet the White Paper missed the opportunity to add this capability to the Type 45 and, in so doing, to improve both military capability while delivering value for money for the taxpayer.

The main obstacles to the fit remain the absence of an identified capability requirement, and affordability within the context of the overall balance of investment in equipment capability. As a MoD official close to the issue stated recently, “the need is there, but is the money? Yet a smaller Type 45 destroyer force with no land attack capability but with an emphasis on an air defence capability against an air defence threat that the MoD itself also assesses as reduced perhaps cannot be regarded as a programme in which the UK has offset cuts with an improved capability for delivering effect.

## CONCLUSIONS

The core missions and unique benefits of maritime forces are proving to be enduring. While future RN equipment programmes will see an emphasis on more flexible, mission-

configured capabilities, smaller defence budgets will continue to constrain future programmes. With technological developments being set against persisting major warship cuts, the RN faces several key challenges in its quest to remain as a significant player alongside US forces in coalition operations. The challenge faced by the MoD in balancing increasing operational requirements and individual programme affordability with dwindling resources should not be underestimated.

The carriers remain the central element of the UK’s expeditionary operations, as set out in SDR, and thus in its contribution to coalition operations. While the affordability of nuclear power remains an issue, submarine operations will continue to have a key role in future scenarios and a platform with the flexibility of *Astute* provides good value for money. For the Type 45, affordability appears to be the key obstacle to fitting a long-range land attack capability. As with *Astute*, additional launchers and rounds will also cost money, but the investment in an already-existing platform which can make only a limited contribution to coalition operations is relatively small compared to the capability benefits that would be accrued.

Finally, a particular issue has been made in the UK of paying off older platforms in order to allow resources to be diverted for the development of new, more capable, networked forces. A networked platform may be able to more ably deliver the right effect at the right place and at the right time in one theatre, but it cannot do so simultaneously in another. This is not an either/or question of platforms or the network. Effective capability to deliver decisive effect requires both.

The new world order has brought for the armed forces significant change in conceptual, doctrinal and operational requirements. Forces based *at sea* need to contribute to operations *from* the sea as a central element in maritime strategy and the defence mission. For the RN, while the future carrier, *Astute* and the Type 45 can provide flexible capabilities which can make a critical contribution to coalition operations, after the latest stage of the Defence Review questions marks still hang over each of them.

\* This article is based on a paper given by the author at the Precision Strike Association’s ‘Precision Strike Technology Symposium’, The Johns Hopkins University Applied Physics Laboratory, Laurel MD, USA, 12-14 October 2004.

\*\* Head of Military Capabilities Programme, Royal United Services Institute for Defence and Security Studies London, UK

<sup>1</sup> In the Strategic Defence Review, internal MoD analysis in background work for SDR showing a force requirement for *at least* 14 SSNs to meet predicted taskings – even before 9/11, Afghanistan, Iraq and the war on terrorism, and even without either TLAM requirements being included as a force driver.

<sup>2</sup> The *Swiftsure* and *Trafalgar* classes carried 25 weapons to be launched from five tubes.

<sup>3</sup> The special forces delivery capability comes through the fitting of Dry Deck Shelter (DDS) facilities.

<sup>4</sup> *Astute* will also be able to carry the existing Block III *Tomahawk*. The VLS-launched version of the Block IV formally achieved initial operating capability on 27 May 2004, onboard the *Arleigh Burke*-class guided missile destroyer USS *Stethem* (DDG 63) (see: ‘Raytheon and Navy Celebrate *Tomahawk* Block IV Fleet Introduction’. Raytheon Company Press Release, 29 September 2004).

<sup>5</sup> Critical issues relating to the programme’s capabilities and affordability – and resultant lengthy discussions between the MoD and the contractor, BAE SYSTEMS – have seen the in-service date slip from 2005 to 2008.

<sup>6</sup> The first six of the eight planned Type 45s have been ordered by the MoD. The first is due to enter service in 2007, with the second and third scheduled to be in service by 2009. Ships four to six, known otherwise as batch two, are scheduled to join the Fleet at intervals of about six months after this. The construction of batch one is under way already.

# Ship-Sinking Monster Waves<sup>(\*)</sup>



White water crashing over the bow of the giant US nuclear powered aircraft carrier USS JOHN C. STENNIS in the Pacific Ocean. STENNIS' bow is approximately 22m above the waterline. (USN)

**Once dismissed as a nautical myth, freakish ocean waves that rise as tall as ten-storey apartment blocks have now been accepted as a leading cause of large-ship losses. Results from the European Space Agency's ERS satellites helped establish the widespread existence of these 'rogue' waves and are now being used to study their origins. For Navies, knowledge of the Ocean environment is essential to operations.**

Severe weather has sunk more than 200 supertankers and container ships exceeding 200 metres in length during the last two decades. Rogue waves are believed to be the major cause in many such cases.

Mariners who survived similar encounters have had remarkable stories to tell. In February 1995 the cruise liner *QUEEN ELIZABETH II* met a 29m high rogue wave during a hurricane in the North Atlantic that Captain Ronald Warwick described as "a great wall of water... it looked as if we were going into the White Cliffs of Dover." And within the week between February and March 2001 two cruise ships – *BREMEN* and *CALEDONIAN STAR* – had their bridge windows smashed by 30m rogue waves in the South Atlantic, the former ship left drifting without navigation or propulsion for a period of two hours.

"The incidents occurred less than a thousand kilometres apart from each other," said Wolfgang Rosenthal, Senior Scientist with the GKSS Forschungszentrum GmbH research centre, located in Geesthacht in Germany, who has studied rogue waves for years. "All the electronics were switched off in *BREMEN* as they drifted parallel to the waves and until they were turned on again the crew were thinking it could have been their last day alive.

"The same phenomenon could have sunk many less lucky vessels: two large ships sink every week on average, but the cause is never studied to the same detail as an air crash. It simply gets put down to 'bad weather'."

Offshore platforms have also been struck: on 1 January 1995 the Draupner oil rig in the North Sea was hit by a wave

whose height was measured by an onboard laser device at 26 m, with the highest waves around it reaching 12 metres.



This rare photo of a rogue wave was taken by first mate Philippe Lijour aboard the supertanker *ESSO LANGUEDOC* during a storm off Durban in South Africa in 1980. The mast seen to starboard in the photo stands 25 m above mean sea level. The wave approached the ship from behind before breaking over the deck, but in this case caused only minor damage.

The mean wave height at the time was between 5-10 m.

Objective radar evidence from this and other platforms – radar data from the North Sea’s Goma oilfield recorded 466 rogue wave encounters in 12 years – helped convert previously sceptical scientists, whose statistics showed such large deviations from the surrounding sea state should occur only once every 10,000 years.

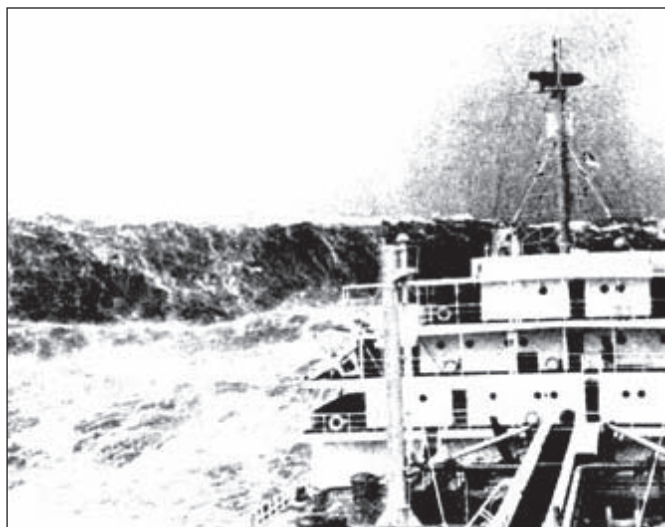


Rogue waves are most common in the Agulhas current off the east coast of South Africa, with numerous well documented cases of extreme individual waves, including some striking photographs of damaged ships. This bow damage was received by the Norwegian tanker *WILSTAR* in 1974. (Photo DLR)

The fact that rogue waves actually take place relatively frequently has major safety and economic implications, since current ships and offshore platforms are built to withstand maximum wave heights of only 15 metres.

In December 2000 the European Union initiated a scientific project called ‘MaxWave’ to confirm the widespread occurrence of rogue waves, model how they occur and consider their implications for ship and offshore structure design criteria. As part of ‘MaxWave’, data from ESA’s ERS radar satellites were first used to carry out a global rogue wave census.

“Without aerial coverage from radar sensors we had no chance of finding anything,” added Rosenthal, who headed the three-year ‘MaxWave’ project. “All we had to go on was radar data collected from oil platforms. So we were interested in using ERS from the start.” ESA’s twin spacecraft ERS-1 and 2 – launched in July 1991 and April 1995 respectively – both have a Synthetic Aperture Radar (SAR) as their main instrument.



A merchant ship labouring in heavy seas as a huge wave looms ahead. Huge waves are common near the 100 fathom curve on the Bay of Biscay.

The SAR works in several different modes; while over the ocean it works in wave mode, acquiring 10 by 5 km ‘imagenttes’ of the sea surface every 200 km. These small imagenttes are then mathematically transformed into averaged-out breakdowns of wave energy and direction, called ocean-wave spectra. ESA makes these spectra publicly available; they are useful for weather centres to improve the accuracy of their sea forecast models.

“The raw imagenttes are not made available, but with their resolution of ten metres we believed they contained a wealth of useful information by themselves,” said Rosenthal. “Ocean wave spectra provide mean sea state data but imagenttes depict the individual wave heights including the extremes we were interested in.

“ESA provided us with three weeks’ worth of data – around 30,000 separate imagenttes – selected around the time that *BREMEN* and *CALEDONIAN STAR* were struck. The images were processed and automatically searched for extreme waves at the German Aerospace Centre (DLR).”

Despite the relatively brief length of time the data covered, the ‘MaxWave’ team identified more than ten individual giant waves around the globe above 25 m in height.



A giant wave produced with a hydraulically-powered wave generator in the Giant Wave Tank in Hanover in 2002. As part of the ‘MaxWave’ project, a team at the Technical University of Berlin worked on simulating their production. Their work guided by computer modelling, the team found rogue waves appear to be formed when slow-moving waves are caught up by a succession of faster waves moving at more than twice their speed, then merge together. (Technical University of Berlin)

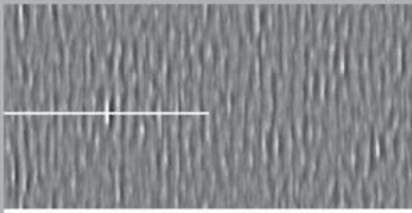
“Having proved they existed, in higher numbers than anyone expected, the next step is to analyse if they can be forecasted,” Rosenthal added. “MaxWave formally concluded at the end of 2003 although two lines of work are carrying on from it – one is to improve ship design by learning how ships are sunk and the other is to examine more satellite data with a view to analysing if forecasting is possible.”

A new research project called WaveAtlas will use two years worth of ERS imagenttes to create a worldwide atlas of rogue wave events and carry out statistical analyses. The principal investigator is Susanne Lehner, Associate Professor in the Division of Applied Marine Physics at the University of Miami, who also worked on ‘MaxWave’ while at DLR, with Rosenthal a co-investigator on the project.

“Looking through the imagenttes ends up feeling like flying, because you can follow the sea state along the track of the satellite,” Lehner said. “Other features like ice flows, oil slicks and ships are also visible on them, and so there’s interest in using them for additional fields of study.

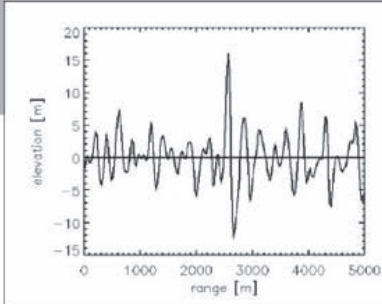
**ERS-2 SAR Detected Extreme Wave**

Aug 20, 1996, 22:51:17 UTC, 44.6 S, 7.1



$H_{max} = 29.8 \text{ m}$

$H_{max} / H = 2.9$



A giant wave detected during a global census using three weeks of raw ERS-2 SAR imagette data, carried out by the German Aerospace Centre (DLR). This SAR data set was inverted to individual wave heights and investigated for individual wave height and steepness. The wave shown here has a height of 29.8 m.

“Only radar satellites can provide the truly global data sampling needed for statistical analysis of the oceans, because they can see through clouds and darkness, unlike their optical counterparts. In stormy weather, radar images are thus the only relevant information available.”

So far some patterns have already been found. Rogue waves are often associated with sites where ordinary waves encounter ocean currents and eddies. The strength of the current concentrates the wave energy, forming larger waves – Lehner compares it to an optical lens, concentrating energy in a small area.

This is especially true in the case of the notoriously dangerous Agulhas current off the east coast of South Africa, but rogue wave associations are also found with other currents such as the Gulf Stream in the North Atlantic, interacting with waves coming down from the Labrador Sea. However, the data shows rogue waves also occur well away from currents, often occurring in the vicinity of weather fronts and lows. Sustained winds from long-lived storms exceeding 12 hours may enlarge waves moving at an optimum speed in sync with the wind – too quickly and they’d move ahead of the storm and dissipate, too slowly and they would fall behind.

“We know some of the reasons for the rogue waves, but we do not know them all,” Rosenthal concluded. The WaveAtlas project is scheduled to continue until the first quarter of 2005.

(\*) First printed in *The Australian Naval Architect*, Aug 2004 and re-printed with the kind permission of its Editor.



The small passenger ship *SULLIVAN* giving its guests a trip to remember. Understanding monster wave patterns will advert many situations like this, which potentially put many lives at risk.



HMAS ANZAC in mountainous seas off WA. Navies need to understand the sea in order to operate on it. (RAN)

# Flash Traffic

## SIRIUS to join RAN

The new oil tanker *MV DELOS*, bought by the RAN for \$50 million last year to replace the ageing HMAS WESTRALIA, will be renamed HMAS SIRIUS.

The name has historical significance. Supply ships HMS SIRIUS and HMS SUPPLY were part of Captain Arthur Philip's First Fleet. They supplied logistic support to form the first colony in 1788.

A NSW State Ferries passenger craft is also named *SIRIUS* and plies Sydney Harbour.

Selection of names for HMA ships is the responsibility of the Chief of Navy, VADM Chris Ritchie.

She will be the first RAN ship to carry the name. NUPSHIP SIRIUS is due to enter service in July 2006 upon completion of a program to give her replenishment at sea capability. This is expected to cost around \$100m.

As the *MV DELOS*, she was bought by Defence upon her completion at the Hyundai Mipo Dockyard in South Korea.

Of 37,000 deadweight tonnes and 176 metres long she has a double hull and is environmentally compliant.

She will be able to provide fuel for both ships and aircraft, along with water.

## Upgraded SYDNEY at sea

The \$350 million upgrade to the first of four the RAN's FFGs, HMAS SYDNEY, is nearing completion with sea trials having started on December 6, 2004.

SYDNEY's return to sea follows almost 18 months of work done initially in the Captain Cook Graving Dock and later at the East Wall of Garden Island by a small army of ADI Ltd workers and sub-contractors.

Among the upgrade tasks undertaken was the fitting of an eight cell vertical launcher on the foredeck to allow the firing of ESSM (Evolved Sea Sparrow Missiles).

The ship can carry a total of 32 of the missiles in a quad pack per VLS cell.

Four new diesel generators were installed along with extensive new

wiring as well as a new and enhanced combat system to allow for improved warfighting capabilities.

Life for the ship's company will be enhanced with an upgrade to SYDNEY's air conditioning system and mess deck improvements.

Commanding Officer of SYDNEY, CMDR Quinn, told *Navy News*, "Our first trials will be in the Eastern Exercise Area and will involve a mariner skills evaluation. Only a small number of ADI people will be with us on this occasion."

He said later trials will involve "contractor's trials" which will see a larger number of civilians join the ship to help test what they have installed.

"In the first quarter of 2005 we will commence more testing including weapons firing and test our new combat systems," he said.

CMDR Quinn said the upgrade had been very complex project.

"However the upgrade has made her a very capable ship," he said.

He said that even while the ship was alongside a program of checks was already well advanced.

"The Damage Control Light Off



The last passage. The former USS TICONDEROGA is towed from her decommissioning berth at Pascagoula, Mississippi, for the inactive storage yard at Philadelphia. She was first commissioned on 22 January 1983. Note the absence of the main mast radar, fire control radars, Phalanx and the covered up bridge windows. At one stage there was a very real offer to have 2-3 of the first baseline lot of the Ticonderoga class (5 ships worth) leased to the RAN to avoid their early retirement from naval service. To any navy outside of the US these early Ticonderoga class cruisers still represent a quantum leap in capability. (USN)

Examination has been achieved and the Material Readiness Assessment was well advanced," he said.

Asked if the ride of the upgraded FFG would be observed during trials (the upgrade has seen 100 tonnes of additional equipment fitted to the frigate taking her weight to 4,200 tonnes), CMDR Quinn said, "yes...but the extra weight has been evenly distributed".

"MELBOURNE, DARWIN and NEWCASTLE will be upgraded," the Maritime Commander, RADM Moffitt said.

Work on MELBOURNE is scheduled to start in the first half of 2005.

*By Graham Davis, NAVY NEWS*

## Tenders called for AWD

The Federal Government has advertised for Australian shipbuilders to bid for one of Australia's largest and most complex Defence projects, the Navy's Air Warfare Destroyers (AWDs).

Defence Minister Robert Hill said a Request for Proposal (RFP) has been released.

The proposal will be for the construction of three AWDs in Australia.

"The RFP will be available to qualified shipbuilding organizations that have entered into agreements with the Commonwealth in relation to confidentiality and related matters."

Senator Hill also said tender documents for the \$4.5-\$6 billion project have been developed by Defence in consultation with independent commercial adviser Carnegie Wylie & Company.

The tender for the construction of the AWDs remained open for nine weeks. Defence is currently evaluating tender responses, with Government to receive a recommendation on the preferred shipbuilder in March 2005.

Once appointed, the preferred shipbuilder will be in a position to assist the Commonwealth select the preferred design for the AWD in mid 2005.

Senator Hill said tenders will be sought on an alliance-style contract basis, with the vessels to be built in Australia. The successful shipbuilder will be majority Australian-owned and be required to satisfy a range of price and non-price criteria, including:

- Commitment to the principles of a long-term risk sharing arrangement

with the Commonwealth and other industry partners for the construction of the AWDs;

- A cost, overhead and pricing structure that will enable the cost effective delivery of the AWDs, including the ability to build designs considering 'whole of life' costs;
- A sound record of past performance in building naval vessels;
- Commercial viability and financial backing;
- Access to the skilled workforce required to produce ships to the Commonwealth's requirements;
- Willingness to provide open financial accounting data – including visibility through to the sub-contractor level – to the Commonwealth;
- Capacity to provide the Commonwealth with transparency and contractual influence over major sub-contractors; and
- Capacity to access sensitive technology required for the AWD project.

Companies bidding for the AWDs will be required to include Australian skills and training programs in their tenders, with Defence to fund companies for extra skills generation and training benefits in the programs.

The AWDs represent a quantum leap in the air warfare capabilities of the Royal Australian Navy. The vessels, which are to be introduced into service from 2013, will be equipped with the world-class SPY-1 and AEGIS combat system that is capable of detecting and defeating multiple hostile aircraft and missiles at ranges in excess of 250 kilometres.

The AWDs will also have an anti-submarine and anti-shipping capability, together with the potential for the ships' sensors to be used to detect ballistic missiles in flight. They will provide significantly increased protection from air attack for troops being transported and deployed and long-range air warfare defence for a Navy task group.

As outlined earlier this year, the Government has asked the international design houses Blohm & Voss of Germany; Gibbs & Cox of the United States and Izar of Spain to produce evolved concept designs based on their existing ship classes; the Saschen Class F-124 Frigate; the Arleigh Burke Class Guided Missile Destroyer; and the Alvaro De Bazan Class F-100 Frigate

respectively.

The AWD project provides a massive opportunity for Australian industry to participate at both the prime and sub-contractor level. The project will also create new Australian jobs and skills and strengthen Australia's strategic industrial base.

## Agreement signed with US on Collins

A new era of co-operation has been reached between Australia and the United States in the further development and improvement of the new combat system being provided for Australia's Collins Class Submarines.

The system, called the AN/BYG-1 Combat Control System, will be installed in both US Navy and Royal Australian Navy submarines under an Armaments Cooperation Project.

A Memorandum of Understanding (MoU) has been signed by Australia and the United States for future joint development, production and support of the combat system.

This latest decision follows the Government's approval of the \$455 million Collins Replacement Combat System Project in September 2002 and will lead to significant upgrades to the capability of the Collins Fleet commencing with the first installation in 2006.

"Co-operating with the US Navy means we have the opportunity to influence the design and development of the systems and to participate in a continuous upgrade process that will provide the latest advances while continuing to meet our particular requirements," Minister for Defence Senator Hill said.

"The co-operative approach also provides opportunities for Australian industry to inject Australian innovative technology into the joint program and to participate in supporting the systems while in service.

"The MoU specifically provides for industry from both countries to bid for work on equal terms and to be selected competitively".

The new combat systems will complement the new Mk-48 advanced capability torpedoes for the Collins Class submarines, also approved by the Government late 2002, and also being developed and produced under an Armaments Co-operation Project with

the US Navy.

## French LHD launched

The first of two new amphibious assault vessels (LHD – Landing Helicopter Dock) for the French Navy was launched at Brest on 6 October 2004. Sea trials of the 21,300 tonne ship are to begin this February. The French LHD is designed to carry up to 400 troops, 16 helicopters and 60 armoured vehicles.

The vessel, named MISTRAL, is classified by the French as a 'Batiment de Projection et Commandement', and is expected to join the French fleet in May or June. It will be followed in 2006 by the TONNERRE.

France ordered the two vessels to replace their two current Ouragan-class dock-landing ships, OURAGAN and ORAGE. Cost of the Mistral project is thought to be approximately EUR570 million (AUD \$982 million).

The middle and stern parts of the hull were built by DCN at its yard in Brest while Chantiers built the forward module at its St Nazaire yard. The two 199m-long ships are costing around 30% less to build than France's two 12,400 tonne Foudre-class amphibious assault ships commissioned in 1990 (FOUDRE) and 1998 (SIROCCO).

MISTRAL's vehicle bay is big enough to house 13 main battle tanks. The ship's flight deck has six spots capable of operating medium or heavy helicopters of the NH-90 or CH-47 Chinook range.

A larger version of the MISTRAL is currently being considered for the RAN's amphibious warfare capability project and is competing against a 28,000



The first, MISTRAL, of two new LHDs for the French Navy being launched. (DCN)

tonne Spanish design by IZAR. A decision is expected next year.

## US Navy leases Swedish sub

The Swedish Government has granted approval for the USA to lease a Gotland-class submarine for a period of 12 months, complete with crew, to participate in joint exercises with the US Navy. The submarine will operate from bases on both the east and west coasts of the United States.

This Swedish participation is designed to enhance the Swedish Navy's ability to cooperate with the armed forces of other nations when participating in international peacekeeping operations. According to the Swedish Government press release, this co-operation is also expected to yield favourable synergies in areas such as the development of submarine systems, the development of sensors and ongoing co-operation in materials development.

Gotland-class submarines, built by Kockums, are equipped with the Stirling AIP (Air Independent Propulsion) system. This allows a 'conventional' (non-nuclear) submarine to remain submerged for weeks at a time, avoiding the need to surface for air and risk detection. This signifies a dramatic increase in operational efficiency. The Gotland-class boats also feature excellent stealth capabilities, and have performed extremely well in international exercises, especially against the US Navy's nuclear submarines.

Swedish submarines are designed specifically for operating in the shallow waters of the littoral zone, and Swedish Navy crews are specially trained in the skills essential to missions in this niche sector.

The Swedish Government granted approval for the lease of a submarine complete with crew, at a cabinet meeting on October 28th 2004. The naval exercises will be initiated as early as the first half of 2005.

## 76 Super Rapid Gun arrives in US

The first missile firing naval gun system, the 'Super Rapid', has been delivered to the United States from Italy.

The Italian 'Super Rapid' is a fully

modular 76mm gun system equipped with a stealth shielded turret. The 'Super Rapid' is able to fire regular ammunition and launch guided missiles from the gun's barrel.

A key feature of the advanced gun is its ability to shoot down cruise missiles.

The new 'Super Rapid' model is a direct descendent of the Oto Melara Mk-75 gun which is used by the RAN and US Navy's FFG-07 class frigates. The Mk-75 gun system is deployed globally in 53 navies and is the most successful naval gun ever produced. Oto Melara and the former FMC Corporation in the United States manufactured about 900 of the Mk-75 guns. So far, 100 Super Rapid's have been produced with another 50 on order.

NATO countries including Canada, Denmark, France, Germany, Spain, Italy, Greece, Turkey and others including Japan and Israel are using the Mk-75 gun and enhanced versions of the Mk-75 for deep water and coastal protection and in counter-terror operations.

The Super Rapid – which fires at the rate of 120 rounds per minute or two shots per second, and can launch a new generation of barrel launched missile at the same rate of fire, has already been adopted by 18 user countries, including seven NATO nations. Norway is putting the Super Rapid on its new high-speed stealth patrol vessels, the Sjkold-class.

## First Kidd due October 2005

The first of the four Kidd-class destroyers the US agreed to sell to Taiwan in 2001 is expected to be delivered ahead of schedule and commissioned into service this year.

David Lee, Taiwan's representative to Washington, said that he visited the shipyard in Detyens, South Carolina, and was briefed that the process of demothballing and renovating the four Kidd-class destroyers has been proceeding smoothly, with the work expected to be finished ahead of the original schedule.

According to a delegation of Taiwanese navy officials who are currently in Detyens to oversee the overhaul of the destroyers' software systems, the first destroyer was originally scheduled to be delivered at

the end of next year.

This would be followed by the second, third and fourth destroyers between 2006 and 2007.

The navy officers are also working there in preparation for taking delivery of the four 9,600-tonne destroyers.

According to an assessment by the Taiwanese navy, the Kidd-class destroyers, which will be equipped with a new missile package, have superb air defence capabilities.

The missile package that was acquired along with the Kidds includes 248 SM-2 Block IIIA Standard missiles and 32 RGM-84L Block II Harpoon missiles.

Also included in the destroyer package, which has a price tag of over US\$818 million, are shipyard and port support services, as well as post-transfer activities, including personnel training and spare parts.

## Mk-54 production begins

Raytheon Company has begun full rate production of the Mk-54 torpedo, the US Navy's next generation lightweight torpedo. This significant milestone follows a series of successful technical and operational evaluations and the US Navy's authorization of initial operational capability for introduction to the fleet.

Co-developed by Raytheon Integrated Defense Systems and the US Navy, the Mk-54 is the next generation anti-submarine warfare weapon deployed from surface ships, helicopters and fixed wing aircraft to track, classify, and attack underwater targets.

Sophisticated processing algorithms allow the Mk-54 to analyse the information, edit out false targets or countermeasures, and pursue identified threats. The Mk-54 is designed for both deep water and littoral environments, making it the only lightweight torpedo capable of striking any target in the world's oceans, regardless of water depth.

"The Mk-54 is the most thoroughly tested torpedo in the world. During the recently concluded operational testing, the Mk-54 met or exceeded all design specifications and significantly surpassed baseline performance requirements," said Rear Admiral John D. Butler, US Navy, program executive officer – Submarines. "With the Mk-54

lightweight torpedo now reaching the fleet, threat submarines truly have no place to hide."

Under the consolidated procurement contract for fiscal year 2004, Raytheon will deliver 51 Mk-54 lightweight torpedoes and associated whole-life support services. The five-year contract value, including exercised options, is expected to exceed US\$500 million.

## Mk-110 57mm gun for DD(X)

The US firm United Defense Industries, Inc. has announced that the U.S. Navy has approved the 57mm Mk-110 Naval Gun as the Close-In Gun System (CIGS) for the baseline design of the new DD(X) Destroyer program.

"Raytheon and United Defense conducted an exhaustive study before recommending the 57mm gun as the best solution for the DD(X) destroyer CIGS mission," said Jim Schoppenhorst, United Defense program director for the DD(X) program.

DD(X) is the centrepiece of a family of ships that will operate within the construct of the Surface Combatant Navy to deliver a vast range of warfighting capabilities that are designed to maximize and revolutionize the combat capability of the Fleet. The function of the Mk-110 Naval Gun is to provide key ship self-protection and attack capabilities. The Mk-110 will work in concert with other combat systems being developed by United Defense, such as the ship's 155-mm Advanced Gun System (AGS) and the Mk-57 Vertical Launching System (VLS).

The Mk-110 Naval Gun Mount is

the United States' version of the 57mm Mk-3 Naval Gun, built by Bofors Defence of Sweden, a wholly owned subsidiary of United Defense. In September of 2003, the Mk-110 Mod 0 was selected for service aboard the U.S. Coast Guard's new Maritime Security Cutter – Large (formerly the National Security Cutter), under the Coast Guard's Deepwater Program.

This versatile gun system is paired with the Bofors Defence family of 3P (Pre-fragmented Programmable Proximity fused) ammunition for combating aerial, surface and ground targets. This ammunition, designated as the Mk-295 Mod 0, gives the Mk-110 Naval Gun increased tactical flexibility and ammunition effects.

Canada currently uses this gun on its Halifax class frigates.

## SM-3 delivered

US firm Raytheon has begun delivering STANDARD Missile-3 (SM-3) initial deployment rounds to the US Missile Defense Agency. The event was marked by a ceremony at the company's Missile Systems operations Centre.

SM-3 is a key element of the Aegis Ballistic Missile Defence System and builds on the existing fleet of Aegis cruisers and destroyers.

Since January 2002, the Aegis BMD (Ballistic Missile Defence) system has successfully intercepted targets in space four times with SM-3. In all the flight tests, the SM-3 was launched from a USN cruiser under increasingly realistic, operational conditions.

There is already international interest in Aegis BMD and SM-3. Japan made



The new Mk-110 57mm CIGS for the new DD(X). Depicted is the original version known as the Bofors Mk-3 which will arm the US Coast Guard's new ships.



the decision earlier this year to procure Aegis BMD and SM-3 missiles for their four Kongo-class Aegis destroyers.

## ADMIRAL GORSHKOV project proceeds

The Russian-built 45,000-ton aircraft carrier ADMIRAL GORSHKOV will be commissioned into the Indian Navy by the end of 2007 and arrive in



The Russian aircraft carrier ADMIRAL GORSHKOV during her Soviet days. The ADMIRAL GORSHKOV will be fully modified and in Indian Navy service by 2008. (RAF)

Mumbai in early 2008, Flag Officer Commanding-in-Chief, Western Naval Command, Madanjit Singh announced recently.

Addressing media onboard the aircraft carrier INS VIRAAAT, he said a team from the Indian Navy was already in Russia to oversee the refurbishment work, which is progressing ahead of schedule.

Former defence minister George Fernandes and his Russian counterpart Sergei Ivanov signed the Rs 7,000-crore deal on January 21, 2004. The financial package includes the supply of the naval variant of 28 MiG-29s. "These planes will be superior to the ones operated by the Indian Air Force (IAF). With an upgraded radar and more powerful engines, the performance of the fighters will be closer to the Sukhois," he stated. "ADMIRAL GORSHKOV, which will be a part of the Western Naval Command, is expected to remain in service till 2033."

Regarding the building of the first indigenous aircraft carrier, designated as an air defence ship, he said the first steel will be cut in early 2005 marking the start of its construction work at the Cochin Shipyard. It will join the Indian Navy in about 10 years.

"About 20 warships are on order at various Indian shipyards and a submarine-building program will be initiated shortly," he said. The new ships will have a powerful combat capability.

When asked about the highly

secretive nuclear submarine program, he said that the navy was "looking at the technology related to a propulsion system, which is nuclear-powered."

## Navy retires AIM-54 Phoenix

After 30 years of highly accomplished service, the USN has retired its first long-range air-to-air missile, the AIM-54 Phoenix on September 30 2004.

One of the world's most technologically advanced tactical missiles, the AIM-54 Phoenix was the first operational radar-guided air-to-air missile that could be launched in multiple numbers against different targets from an aircraft, making the Phoenix the USN's main fleet air defence long-range weapon.

"The heart of the F-14 Tomcat (soon also to retire) weapons system is the Hughes AWG-9 fire control system, capable of tracking 24 targets and firing six AIM-54 Phoenix air-to-air missiles engaging six different targets," said Captain Scott Stewart, the USN's program manager for Air-to-Air Missile Systems. "With a range of over 100 nautical miles, the AIM-54 gave the F-14 the greatest stand-off engagement capability of any fighter in the world. For years, Soviet air crews flying Badger, Bear and Backfire bombers feared the unprecedented capabilities of the Phoenix Missile."

A product of two US missile programs – the Navy's Bendix

AAM-N-10 Eagle and the Air Force's Hughes GAR-9, Phoenix long-range intercept concept development began in 1960. The Hughes Aircraft Company was first selected to develop the Phoenix in 1962, with the Raytheon Company joining later in 1988.

After five years of research and development, the first prototype flight tests were conducted in 1965. On September 8, 1966, an A-3A Skywarrior performed the first successful full-scale test using all missile control system functions over the Navy Pacific Missile Range near San Nicholas Island, California.

November 21, 1973, marked a milestone for Phoenix with the first full arsenal testing on an F-14 operating over the Pacific Missile Sea Test Range. Within 38 seconds, the Tomcat launched and simultaneously guided six Phoenix missiles, at six separate targets 50 miles away, scoring four direct hits.

The AIM-54A entered service with the US Navy in 1973 and became operational in 1974. The first F-14A Tomcat squadrons to use the Phoenix were Strike Fighter Squadron (VF) 1 'Wolfpack' and VF-2 'Bounty Hunters'.

After several variants, the long-range concept ultimately evolved, providing Phoenix the capability to initially guide itself using the semi-active radar mode and the Tomcat's AWG-9 weapon control system, and when close enough to its target, assume guidance control using the active radar system. The C variant incorporated a new active radar fuse and higher-thrust motor. Combining these



A USN F-14 Tomcat firing an AIM-54 Phoenix AAM. The US Navy retired the AIM-54 Phoenix long-range air-to-air missile on 30 September 2004 after 30 years of service. The Phoenix had a range of 180kms. It was the first radar-guided missile that could be launched in multiple numbers from the same aircraft simultaneously against different targets. (USN)

upgrades improved its overall effectiveness and intercept capabilities. The AIM-54C was introduced to the fleet in 1981, and entered full-rate production in January 1984.

## CANTERBURY near end

Serious corrosion in hull and deck plating on the RNZN's aging frigate HMNZS CANTERBURY means the ship is no longer fully seaworthy.

The 34-year-old warship was put into dry dock at the Devonport Navy base in Auckland during last year to see if it was in good enough shape for its life to be extended beyond a retirement date of this March.

The survey found that corrosion in some deck and hull plates was far worse than anticipated.

The RNZN has refused to answer questions about the problem, but released a statement that said the survey had found corrosion in hull plating in the main machinery spaces.

"The areas were beyond the allowable corrosion limits for this type of vessel and repairs were necessary before the vessel could proceed to sea," the statement said.

CANTERBURY is no longer considered a fully operational warship because of its fragility. It is used for training, fisheries patrols and other missions, such as supplying the weather station at Raoul Island, about 966km northeast of Auckland.

It is understood that the ship is on a speed restriction.

CANTERBURY is due to exercise in Australian waters in February. In March it will make a farewell trip round New Zealand, including visits to Timaru and its homeport of Lyttelton, before returning to Devonport to be decommissioned.



HMNZS CANTERBURY. Serious corrosion in hull and deck plating on the RNZN's aging frigate HMNZS CANTERBURY means the ship is no longer fully seaworthy. (RNZN)

The future of CANTERBURY's sister ship, WELLINGTON, is unknown. It has been tied up at Devonport since it was decommissioned in April 2000, as a source of spare parts for CANTERBURY.

WELLINGTON's auxiliary switchboard was put into CANTERBURY last year, after a fire at sea when the latter was on a fisheries patrol near the Chatham Islands.

## ÖSTERGÖTLAND upgraded

"The launch of HMS ÖSTERGÖTLAND further enhances the effectiveness of Sweden's security concept, a concept that has gained respect throughout the world" said Kockums' CEO Martin Hagbyhn at the launch of the Swedish Navy submarine HMS ÖSTERGÖTLAND in Karlskrona on September 3, 2004.

ÖSTERGÖTLAND, as her sister vessel HMS SÖDERMANLAND before her, has now undergone an extensive upgrade. Both submarines have been equipped with the Stirling AIP (Air Independent Propulsion) system. This enables a conventional (non-nuclear) submarine to remain submerged for weeks at a time, without having to surface. This dramatically increases the submarine's operational effectiveness. The upgrade also enables the submarines to operate more effectively when engaged in international missions, and in warmer waters.

Kockums has cut the submarine in two and inserted a new section, increasing its length by 12 meters to an overall length of 60.5 meters. The vessel's displacement has been increased by 430 tonnes to 1,500 tonnes. With the launch of HMS ÖSTERGÖTLAND, all Swedish Navy submarines now in operational service are equipped with the Stirling AIP system.

## China apologizes for submarine incursion

Japanese officials have confirmed that China has apologized for one of its submarines sailing into Japanese waters last November. However, China has refused to confirm the apology, saying only that a "diplomatic" resolution has been reached.

Japan says China admitted the mystery submarine was one of its own, and expressed regrets.

Japan's Foreign Ministry says the message was conveyed by Chinese Vice Foreign Minister Wu Dawei to Japanese Ambassador Koreshige Anami in Beijing.

Tokyo says Beijing told it the submarine was on a training mission, and for "technical reasons", it ventured into Japanese waters.

Foreign Ministry Assistant Press Secretary Akira Chiba says China's official response also contained an apology.

"We take it as an official apology since the word "sorry" was used. On the other hand, we have asked them to prevent such incidents from happening again and for that we have haven't gotten any response yet," he said.

China's Foreign Ministry was later more circumspect about the matter. At a regular briefing in Beijing, Foreign Ministry spokeswoman Zhang Qiyue would only say that China had passed on information to Tokyo.

Ms. Zhang says China had already informed Japan on the relevant matter through diplomatic channels, and the issue has been properly addressed.

When pressed by reporters for more details, Ms. Zhang merely repeated the same formula over and over.

The submarine, believed to be a Han-class nuclear powered vessel, spent two hours submerged in Japanese waters, near Taiwan.

The incursion prompted Japan's maritime forces to go on alert for only the second time since the end of World War II.

## LPD-18 christened

In celebratory tradition, Carolyn Shelton, ship's sponsor, smashed a champagne bottle across the hull of the USN amphibious transport dock ship LPD-18, officially christening the ship NEW ORLEANS.

Mrs. Shelton, wife of U.S. Army Gen. Henry Hugh Shelton (Ret.), the former chairman of the US Joint Chiefs of Staff, exclaimed, "bless this ship and all who sail in her", prior to her christening in the presence of approximately 1,000 guests.

Principal speaker, U.S. Navy Adm. Vern Clark, chief of US Naval Operations said the ship "will be ready

to take American sovereignty to the far corners of the earth, for the capability designed within this ship and for our Navy-Marine Corps team, is truly a bridge to the future."

NEW ORLEANS (LPD-18) is the second ship in the San Antonio (LPD-17)-class of amphibious transport dock ships being built by Northrop Grumman for the Navy/US Marine Corps team. Construction is taking place at the company's New Orleans shipyard with fabrication and additional support from three other company facilities in Pascagoula and Gulfport, Miss., and Tallulah, La.

Displacing nearly 25,000 tons, these will be the second-largest ships in the Navy's 21st Century Expeditionary Strike Groups. NEW ORLEANS will have a crew of 360 and can carry up to 699 troops with a surge capability of up to 800.

The ships are 208.5 metres long and 31.9 metres wide and will replace the functions of four classes of older amphibious ships.

## Gibbs & Cox completes AWD design

Gibbs & Cox, Inc. has announced that they have completed their Phase 1C design studies for the RAN's SEA 4000 Air Warfare Destroyer (AWD) Project, and have submitted their proposal for the role of Preferred Ship Designer for Phase 2 of the Project. Gibbs & Cox, Inc. is the only U.S. firm being considered for this role.

The Gibbs & Cox, Inc. AWD design developed in Phase 1C is thought to meet Australia's requirements for a multi-mission surface combatant providing affordable maritime air warfare capability. Since the design is part of a competitive selection, Gibbs & Cox, Inc. is not releasing any details of their offer but it is thought to be a smaller version of the USN's Arleigh Burke class destroyer (referred to at times as 'the baby Burke').

Gibbs & Cox, Inc. assembled a Team of leading experts to perform the Phase 1C studies. The Team included Anteon Corporation; Angle, Inc.; Basic Commerce & Industries; ICI, LLC; Lockheed Martin Corporation Tactical Systems; Romulus, LLC and Technomics, Inc.

The RAN selected Gibbs & Cox,

Inc. to participate in the Phase 1C studies based on its experience as the lead ship design agent for the USN's DDG-51 class ships, its experience with integration of the AEGIS air warfare systems onto surface combatant platforms, and its demonstrated ability to work with Australian industry. Gibbs & Cox, Inc. has supported the RAN for over 30 years on most of its major surface combatant programs. For Phase 2 of the AWD Project, Gibbs & Cox, Inc. is committed to establishing and maintaining an in-country design capability that includes significant Australian Defence Industry participation.

## GLOUCESTER deploys to Falklands

The RN Type 42 Batch III destroyer HMS GLOUCESTER was deployed to the South Atlantic and Falkland Islands from her Base Port in Portsmouth during last November.

The 4-month deployment will see GLOUCESTER visit Sierra Leone, Brazil, the Falkland Islands, South Georgia and the Canaries before returning to UK in March. As 'The Fighting G' took a few weeks to reach Sierra Leone, she conducted a number of training serials during her passage South, in preparation for her tasking to the South Atlantic, including a firing of her main missile system, the Sea Dart.

Following the Ship's defence diplomacy visit to Sierra Leone, GLOUCESTER crossed the Atlantic Ocean to Rio de Janeiro, Brazil. The Ship is due to arrive in the Falkland Islands in early Jan 2005, where she will conduct maritime patrols of the waters surrounding the Islands and South Georgia. In addition, she will participate in a number of exercises with other British Army and RAF units located permanently in the Falkland Islands.

## Last F-100 launched

The Izar Shipyard in Ferrol, Spain, celebrated the launching of the Spanish Navy frigate MÉNDEZ NÚÑEZ, fourth and last of the F-100 class. The ceremony took place the 12 November 2004.

It is estimated that 80% of the ship was completed before launching, a high percentage thanks to the integrated construction system developed by the

shipyard. The commissioning of F-104, scheduled for February 2006, will put an end to the F-100 program.

The F-100 class is currently under consideration by the RAN for its air warfare destroyer project, SEA 4000. It is equipped with a SPY-1 radar and Aegis combat system with SM-2 missiles.

F-104 frigate characteristics:

Length	146.70 m.
Breadth	18.60 m.
Full load displacement	5,800 t.
Draught	4.84 m.
Maximum speed	28.5 knots
Range (cruising speed)	4,500 miles
Crew	202

In other Izar news, Izar and the Norwegian Navy have modified the original contract for the construction of five F-310 frigates. All the ships will now be assembled and launched at Izar Shipyard in Ferrol.

In the initial contract it was agreed that only three ships were assembled and put afloat in Spain, whereas the rest would be assembled in Norway.

The decision was made because it was felt that Norwegian shipyards do not have the experience to build modern frigates without imposing delays in the



The Spanish Navy frigate MÉNDEZ NÚÑEZ, fourth and last of the F-100 class, being launched at the Izar Shipyard in Ferrol, Spain. The ship was launched 80% complete. (Izar)

program.

The frigate FRIDTJOF NANSEN F-310 will be delivered next spring. In April crew will arrive at Ferrol for training on the ship and her systems.

## Naval activity in the West

After the KITTY HAWK Carrier Strike Group (CSG) visit in April 2004 there was a break of nearly six months before the next foreign naval units would next visit WA.

The first was the frigate USS FORD (FFG-54) that was part of the STENNIS



The Arleigh Burke Flight IIA destroyer USS HOWARD (DDG-83).  
This was the first visit for USS. HOWARD to Western Australia.

CSG, which docked on 24 September in the southwest port of Bunbury. This was the frigate's second visit to Bunbury since 2000 and the crew enjoyed the chance for R&R.

The STENNIS CSG utilised the Lancelin Firing Range for a few days before the Nimitz class aircraft carrier, USS JOHN C. STENNIS (CVN-74) with Carrier Air Wing Fourteen embarked, anchored in Gage Roads off Fremantle for a six day R&R visit. With the STENNIS was the cruiser USS LAKE CHAMPLAIN (CG-57) and the Arleigh Burke Flight IIA destroyer USS HOWARD (DDG-83). The Military Sealift Command Fast Combat Support ship USNS RAINIER (T-AOE-7) also anchored in Gage Roads, it was the first visit by the RAINIER after her transfer from the USN to MSC in 2003.

This was a visit of firsts and lasts. HOWARD became the first of her class to visit Western Australia and drew interest from civilians and military alike. For LAKE CHAMPLAIN this was her last visit before a major refit and upgrade of her systems.

Carrier Air Wing 14 (NK) were on their tenth visit to Fremantle. With CVW-14 were the F-14D Tomcats of VF-31 'Tomcatters' who became the last Tomcat squadron in the US Pacific Fleet. After this cruise VF-31 would transfer to the Atlantic Fleet onboard Carrier Air Wing Eight onboard the USS THEODORE ROOSEVELT (CVN-71) before transiting to the F/A-18 E/F Super Hornets in 2007.

This was to be the last foreign port

for the STENNIS CSG before returning to San Diego in late October. For the JOHN C. STENNIS it is to be a busy period as the carrier and her 2500 crew and their families would begin to move homeports from San Diego to Bremerton in Washington State by late January 2005.

As the STENNIS CSG sailed from Fremantle on 3 October 2004 they passed a warship from the Republic of Singapore that had anchored in Gage Roads for an overnight stay before proceeding to HMAS STIRLING the next morning.

That warship was the Endurance class tank landing ship RSS PERSISTENCE (L-209) which docked alongside Oxley Wharf on 4 October. At 6,000 tonnes PERSISTENCE was built in Singapore and commissioned in April 2001. PERSISTENCE is part of the RSN's 3rd Flotilla 191 Squadron and was on a Midshipman Sea Training Deployment with HMAS STIRLING the last port before their return to their homeport of Tuas Naval Base in Singapore.

On 14 October a task force of three Indonesian warships with over 500 sailors and marines embarked pulled alongside Diamantina wharf at HMAS STIRLING. The ex-Dutch Van Speijk class frigate KRI KAREL SATSUITUBUN (356) and KRI FATAHILAH (361), the lead ship in her class of corvettes, and the ex-U.K. Rover class replenishment oiler KRI ARUN (903) became the first units of the Tentara Nasional (Indonesian Navy)

to dock at Fleet Base West. Tentara Nasional Commodore Agus Suhartono commanded the task force, which was at HMAS STIRLING for a four-day visit before joint training exercises with HMAS MELBOURNE (FFG-05) off the WA coast.

*By Ian Johnson*

## Navy League (VIC) hosts Navy

Seventy-one Navy League members and guests attended a luncheon in the Naval and Military Club in Melbourne to welcome three RAN ships; BALLARAT, MELBOURNE and BANDICOOT. Among the guests were members of the ships companies from the three ships as well as Captain R. Richards, Senior Naval Officer Victoria, and LCDR J. Goss, Executive Officer HMAS CERBERUS.

The President of the Victoria Division of the League, CMDR John Wilkins, presented ships' Captains with copies of some of the naval related books which he has published and CDRE Dacre Smyth made presentations of various books of his paintings.

The occasion also celebrated the 80th birthday of the League's Federal Secretary, Ray Corbooy.

*By John Bird*

## Second Scorpene for Chile

On 24 November, IZAR's Cartagena yard launched the submarine CARRERA for the Chilean Navy. The Defence Minister of Chile, Jaime Ravinet de la Fuente, and the C-in-C of the Chilean Navy, Admiral Vergara, presided over the ceremony.

The commissioning of CARRERA



The Scorpene class submarine CARRERA being lowered into the water for the first time on 24 November 2004 at IZAR's Cartagena yard in Spain. This is the second Scorpene class submarine for the Chilean Navy. (Izar)

will take place next year in Cartagena after sea trials. This is the second unit of the Scorpene Program for Chile carried out jointly by DCN of France and Izar of Spain.

The Scorpene is a state of the art conventional submarine. It is designed for anti-submarine and anti-surface operations. Its commercial success arises from its low maintenance cost and crew of only 30. It has very low acoustic, magnetic, electromagnetic and infrared signatures and is highly automated. It is equipped with six torpedo launching tubes for 18 weapons.

The vessel can operate at a depth of over 300m and has a maximum submerged speed of 20 knots.

IZAR Cartagena's order book is in very good condition with two more submarines for Malaysia, also of the

Scorpene Class, and four units of the S-80 class submarine for the Spanish Navy.

## Sikorsky to replace Canadian Sea Kings

Sikorsky Aircraft Corporation has announced it has signed contracts worth \$5-billion with the Government of Canada to provide and maintain 28 Sikorsky H-92 maritime helicopters. The new H-92s will replace Sea King aircraft currently in service with the Canadian Forces and deliveries are scheduled to begin in late 2008.

Canada's new H-92 'Cyclones' will be multi-mission capable and will perform surface surveillance and control, subsurface surveillance and control, and utility operations that include search and rescue, passenger and cargo transfer, medical evacuations and tactical transport.



Executive members of the Navy League of Australia pose for a picture outside of Canberra's HMAS HARMAN at the conclusion of the League's AGM on 16 October 2004. From L to R; Federal Vice-President Harry Josephs, Kevin Hurd (Tas), Federal Vice-President Harry Adams, Alan Preskett (SA), John Jeremy (NSW), Federal President Graham Harris, Federal Vice-President Andrew Robertson, Trevor Vincent (WA), Keith Adams (NSW), Robert 'Otto' Albert (NSW), Bill Kynaston (WA) and Federal Secretary Ray Corboy (missing from photo; Geoff Evans and Phillip Corboy).

# Observations

By Geoffrey Evans

## AUSTRALIA'S DEBT TO THE ROYAL NAVY – A REMINDER

October 21, 2005, will mark the 200th anniversary of the Battle of Trafalgar, widely accepted as the most significant sea battle to take place in the centuries-old age of sail. The battle, in which a fleet commanded by Vice Admiral Horatio Nelson defeated a French fleet under Vice Admiral Villeneuve at Cape Trafalgar, off the Spanish coast, ensured the predominance of Britain's Royal Navy and made possible the eventual defeat of Napoleon Bonaparte's armies. In the following 100 years, under the watchful eye of the Navy trade between countries grew and prospered, while the British Empire of which Australia was a fledgling member reached its zenith.

In the forward to the authoritative *History of the Royal Navy*, editor Peter Kemp notes that Britain's national economy throughout her history as a nation has depended upon the sea and the ability to use it to her best advantage. The same could be said of Australia today, at least as far as the national economy is concerned, but whether or not the sea is used "to best advantage" is open to debate.

It is a matter for conjecture how Australia would have developed and which country would have been the developer – if Britain had not become the major seapower, largely due to changes in the 17th century when it was realised that ships could not carry both cargo and a large number of guns, leading to separation – 'merchant ships' and the permanently manned, more expensive 'King's ships'. The Royal Navy was so-named during this period.

In the event, Britain's navigators and explorers were enabled to roam far and wide and, among other things, to claim on behalf of the Crown the east coast of Terra Australis – named 'Australia' from 1824, sadly too late for Matthew Flinders who had suggested the name two years previously after his exploration with George Bass of much of the country's coast at the end of the 18th century. Flinders died in 1814 after writing *Voyage to Terra Australis*, a valuable scientific work on hydrography and navigation.

The Royal Navy has a very long history. According to Kemp it was "born" in 1391 during a long period of almost continuous wars between England and France. In that year the hitherto spasmodic appointment of Lord High Admiral "to command the King's ships" was made a permanent appointment (although subsequently there were times when he had no ships to command!). Growth however, took place and in 1546 a Navy Board was appointed to superintend the civil aspects of what had become a sizeable permanent naval force. The next important administrative change took place in 1832, largely due to the advent of steam propulsion and technological developments that necessitated the replacement of wooden ships armed with muzzle loading cannon with greatly improved materiel becoming available; in that year the office of Lord High Admiral and the Navy Board were brought together and a Board of Admiralty established.

Equally important, by the late 1850s personnel and conditions of service had begun to receive long overdue attention and the first steps taken to provide both officers and

lower deck sailors with a worthwhile career structure. After 1885 a system of administration had evolved that served Britain well until after the Second World War (in 1964 the functions of the Admiralty were subsumed in a reorganised Ministry of Defence) and provided the administrative pattern for the future development of Australia's Navy.

Australia, the once-elusive 'great south land' of the past, is inextricably linked to the sea and its history to the Royal Navy; Cook, Flinders and Bass, Phillip, Hunter, Bligh, King, Darling, Stirling, Fremantle, Wickham and Stanley, Hotham – the present generation of Australians see these names every day in some city or part of the country – were all Royal Navy people who played a part in establishing the base on which future settlers were able to build and in the course create a nation – the only single nation to occupy an entire continent.

Australia's naval history is relatively short compared to that of Britain and its navy was formed and developed, not as a consequence of constant warfare, but from a growing sense of responsibility and desire for independence; the early settlers were well aware of their isolation and the seas over which came their supplies, and materials but, after all, the Royal Navy was there to protect their interests. It is on record that New South Wales and Victoria each acquired a minor armed vessel in the 1850s (a ketch and a steam sloop) but it was not until 1885 that the first serious steps were taken to obtain worthwhile colonial participation in the country's naval defence; Rear Admiral Sir George Tryon was appointed to command the Royal Navy's Australia Station and sent to Australia for that purpose.

Admiral Tryon's appointment marked the beginning of a period of protracted negotiations involving areas of responsibility, command and control, costs, the manning of ships, local (as opposed to Overall) defence and other matters until Federation on 1 January 1901; three months later five seagoing ships and a small number of officers and men serving in four States passed into the control of the Commonwealth Ministry of Defence. The Royal Navy's Australian Squadron remained on station.

Inevitably the control and administration of the Australian Navy would be influenced by British procedures, indeed after 1905 when a Naval Board was created, consisting of a government minister, a serving naval officer and a civilian finance member, the Australian structure virtually mirrored that of the Admiralty, albeit there were some differences in the area of ministerial responsibility. Hitherto the responsibility of a Defence Minister, in 1915 a separate Department of Navy with its own Minister was established and took charge of the recently re-titled Australian navy – the 'Royal' prefix had been granted in 1911 – and this arrangement lasted until 1921 when responsibility for naval affairs reverted to the Defence Ministry: Responsibility changed again in – 1939, when the Department of Navy was re-created shortly after the outbreak of the Second World War and remained in existence until the Australian armed forces were integrated and merged into a single Department of Defence in 1975.

From the conception of an Australian Commonwealth naval force in 1901 until the 'Royal' Australian Navy was born in 1911, dependence upon the Royal Navy was, for practical purposes, complete, in particular for personnel who were needed to man and train the new navy. Close personnel and training links together with many other Royal Navy procedures and customs continued until after the Second World War, but naturally Australian's desire for independence from the 'Mother Country' brought about change. The operational control of ships and naval policy, recruiting, pay and conditions of service, discipline, ship design, ship acquisition, local shipbuilding – all came under the microscope, were discussed and issues resolved between the end of the first World War and the beginning of the second on Australia. The influence of Britain's Admiralty and the Royal Navy, cannot be disputed, either on the early development of the country or on the development of its navy. So far as the latter is concerned the soundness of the influence is perhaps best epitomized in six names Collins, Farncomb, Waller, Dechaineux, Rankin and Sheean: Any navy or organisation able to produce such men could hardly be considered unsound. The Battle of Trafalgar, 21 October 1805, would seem a worthy occasion to remember.

## MEMORIES

It so happened that the two ships the writer served in during the Second World War – the armed merchant cruiser MANOORA and the destroyer WARRAMUNGA – were at

various times attached to Royal Navy and USN fleets. MANOORA arrived in Singapore on 6 December 1941, passing the battleship PRINCE OF WALES on the way up the harbour and departed on 8 December shortly after the first bombs fell on Singapore: PRINCE OF WALES, which had been joined by the battle cruiser REPULSE, sailed later on the same day and on 10 December both capital ships were sunk by Japanese torpedo bombers. MANOORA went off in a different direction, to Calcutta, and spent a rather worrying period in the Bay of Bengal escorting convoys from Calcutta and Madras to Rangoon. MANOORA returned to Australia in March 1942 as part of a convoy escort that included one of the Royal Navy's oldest battleships, the ROYAL SOVEREIGN, a wondrous sight as she seemed not to 'ride the waves' but rather to plough through regardless.

WARRAMUNGA on the other hand spent most of her WW II service with the US 7th Fleet. The writer's main impressions are of an ever, increasing number of ships employed on operations – cruisers, destroyers, escort (aircraft) carriers – and of very efficient repair and maintenance tenders – floating workshops positioned in forward areas to look after the needs of destroyers and lesser ships.

Without knowing it at the time, my shipmates and I were witnessing one of the significant moments in history, the time when Britain passed to the United States the mantle of supreme seapower.



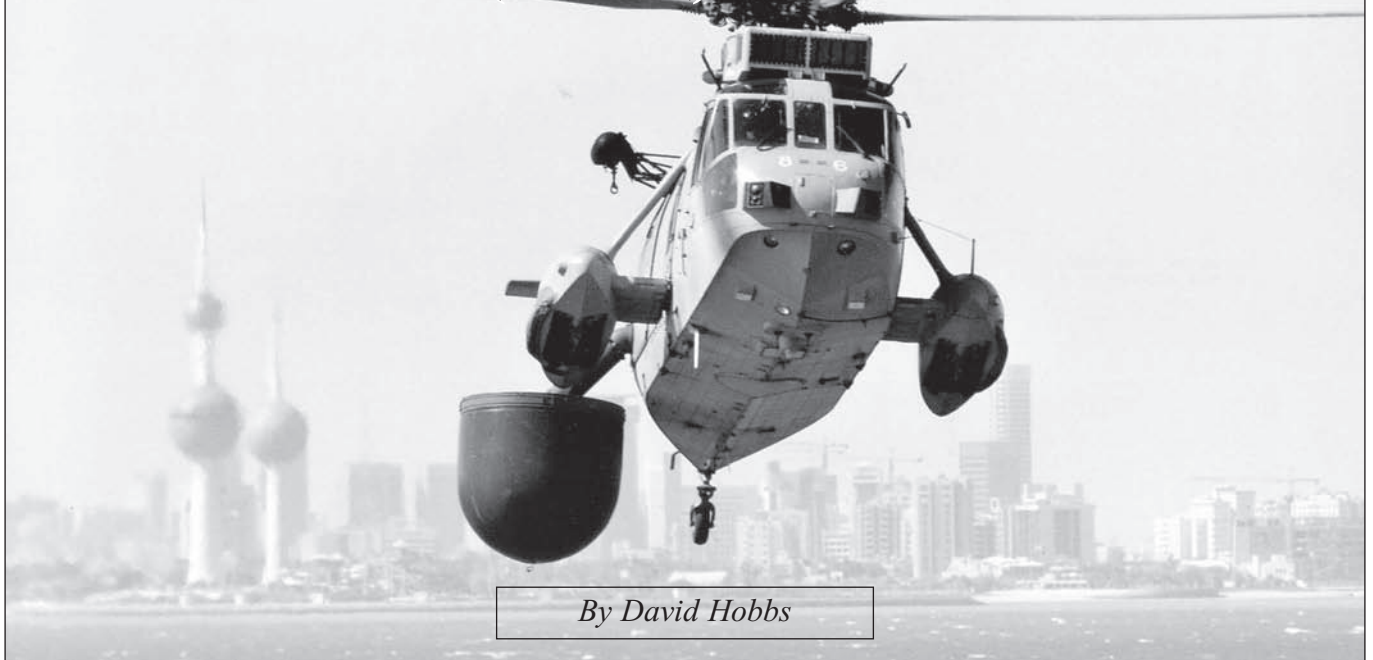
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# THE AIRBORNE SURVEILLANCE and CONTROL (ASaC) SEA KING Mk 7



An Airborne Surveillance and Control Sea King helicopter off Kuwait City just before Operation Iraqi Freedom. Formally known as an AEW platform the name change is designed to promote what the new Mk-7 version of the Sea King can provide the commander. (RN)

**With the successful introduction of the Sea King Mk 7 into operational service, the Royal Navy has acquired world-class equipment that is of critical importance in the twenty first century. When compared with other recent British projects, the fact that it has done so on time, on cost with a minimum of fuss is almost as remarkable as the new radar system itself.**

## Airborne Early Warning

Like the human eye, radar cannot see what is on or near the surface beyond the horizon, a fact exploited by Fleet Air Arm strike aircraft and Axis aircraft attacking allied task forces in World War II. A Royal Navy Staff Requirement, written in 1943, suggested the use of airborne radar sets to extend the horizon but there was no development capacity in the UK to take the idea forward. In 1944 the Anglo-US Scientific Committee passed the Requirement to the United States for development. They called for a 'lightweight' airborne radar set that could detect a target the size of a destroyer at 200 miles and, within the power output required for this, detect low flying aircraft at the maximum range possible.

The task was given to the Massachusetts Institute of Technology's facility at Mount Cadillac in June, 1944 and was imaginatively named the "Cadillac Project". The resulting radar, designated the AN/APS-20A, was one of the great technological achievements of the war and flew in a modified TBM Avenger only 8 months after the start of the project. By May 1945, 35 AEW (Airborne Early Warning) Avengers were in the Pacific Theatre of Operations but none saw active service before VJ Day.

## 849 Naval Air Squadron

After the war, the US Navy selected the Douglas Skyraider as the most suitable AEW platform and 168 were ordered in 1950. The Royal Navy could not afford to buy the type but,

in 1951, 50 were made available under the Mutual Defence Assistance Programme (MDAP). These were used to form a new 849 Squadron (the number had previously been used by an Avenger strike squadron that had fought with distinction in the British Pacific Fleet). The squadron followed contemporary USN practice in having a shore based headquarters and training unit designated 849HQ with autonomous flights of four aircraft embarked in each of the operational carriers designated 849A onwards. A, B, C, D and E Flights saw service in the 1950s.

## Major differences

The Cadillac Project produced an aircraft with a powerful radar which transmitted its picture to surface warships using a data link. Aircrew comprised a single pilot and one or two radio mechanics to work the electronics. Although the radar worked extremely well, the data link proved very disappointing and, since the aircrews were not trained to make use of the information available in the aircraft, the first AEW Avengers were useless. The Skyraider contained a better data link and, interestingly, a radar screen for the pilot but, at first, it still lacked anyone in the aircraft trained to use the radar. The Royal Navy took a radically different approach from the start and flew the Skyraider AEW 1 with a single pilot and two observers, qualified as fighter controllers and skilled in the use of airborne radar. The data link was retained as a secondary means of passing information.



## The Gannet AEW 3

The Skyraider was a very successful aircraft, in many ways ahead of its time. Its 'Achilles Heel' was its 2,700 hp Wright Cyclone engine which used low flashpoint AVGAS as fuel. This was difficult and dangerous to store in carriers and Admiralty policy was to replace piston engines with diesel burning jets as quickly as possible. In consequence, an almost completely redesigned version of the Fairey Gannet ASW (Anti-Submarine Warfare) aircraft was procured for the AEW role. Forty-four examples were built and it replaced the Skyraider in 1960 (the last USN Skyraiders were stood down ten years later in 1971).

The Gannet had a developed version of the basic radar, the AN/APS-20F and the useful 'Bellhop' data link to transmit radar information to surface ships. Crews of one pilot and two observers were retained and the aircraft remained in service until 1978 when ARK ROYAL paid off following the unwise political decision to scrap Britain's aircraft carriers. By then the RAF had become interested in AEW and even put some AN/APS-20 sets into aged Shackleton aircraft. Tied to land bases, these proved of no value during the 1982 war in the South Atlantic.



A RN Gannet AEW aircraft about to 'trap' aboard a RN aircraft carrier. The Gannet was fitted with an AN/APS-20F radar which could detect a destroyer sized target at over 200 miles. It had one pilot and two observers and a data link back to the carrier. (RN)

## The Falklands Experience

In 1982 British defence planners re-learnt the lessons, previously obtained at such cost, that strike aircraft could attack 'under the radar horizon' and surprise surface ships with no airborne radar cover. Depressingly, the Argentines used techniques pioneered by the Royal Navy itself for the Buccaneer strike aircraft and subsequently adopted by the RAF and many other air arms.

The message was seen with stark clarity and extraordinary steps were taken to provide an AEW capability that could be deployed in support of British expeditionary forces. In only 11 weeks a Sea King helicopter flew with an AEW derivative of the Searchwater radar originally fitted to the Nimrod maritime patrol aircraft. This was an outstanding achievement but even then, it would not have worked without a handful of former 849 observers who were able to create a workable system. Two interim standard Sea King AEW 2s sailed with HMS ILLUSTRIOUS and her battle group in the summer of 1982 just after the conflict.



The AEW Sea King was developed over an 11 week period when it became painfully obvious during the 1982 Falklands conflict that AEW was still a necessity. Two Sea Kings fitted with a searchwater radar deployed to the Falklands for the first time on HMS ILLUSTRIOUS when she relieved HMS INVINCIBLE after the conflict. (RN)

## Helicopter AEW

849 Squadron re-formed in 1984 as the world's first helicopter AEW unit organised in the familiar system of autonomous flights. Two front line units have deployed to the operational carriers, 849A and 849B. Each flight comprises three aircraft and has five pilots and 10 observers. Unlike the ASW version of the Sea King, 849 fly with a single pilot but one of the observers moves into the left hand seat for take off and landing in case a malfunction of the computerised engine control systems needs a 'third hand' to work the manual throttles. Because of the low ground clearance, the radar scanner was mounted on a hinged arm that is lowered in flight and used an inflatable bag rather than a conventional radome to save weight. This feature gave the Sea King AEW 2 its nickname and they were affectionately known as "bags", the observers in consequence being "bagmen". None of the airframes were new; all were conversions from early production anti-submarine batches. Indeed, some date back to the IFTU (Intensive Flying Trials Unit) formed in 1969.

## Flying an AEW sortie

Pulse radars like AN/APS-20 and Searchwater pick up returns from the land and wave crests, which show on the screen as clutter which gets worse near the receiver. Climbing increases the range visible to the horizon but also increases the area of clutter. Descent reduces the area of clutter but also the range to the theoretical radar horizon. An aircraft on a 'barrier' combat air patrol will tend to fly relatively high to gain initial contact and descend to keep targets out of the clutter. As in the Gannet, the "bagmen" relied on chinagraph pencils to plot tracks and plastic "wiggers" to measure intercept angles. Lest any forget, examples of both are displayed in the 849HQ crew-room at the UK's RNAS Culdrose attached to a model dinosaur! The principle weakness of the AEW 2 was the inability of its pulse radar to detect targets over land or in littoral areas. Both were 'blue water' systems.

"Bags" have operated in every theatre of operations in which the Royal Navy has been involved since 1985. These include the Gulf, Adriatic, Atlantic and Pacific. They have operated in every weather and in a diversity of roles including Airborne Early Warning (AEW), Anti-Surface Vessel Warfare (ASuW), SAR and even ASW surveillance. Helicopters lack

the performance envelope of fixed wing aircraft and are limited to 10,000 feet by the lack of an oxygen system. The need for parachutes has been a long running issue. They have some advantages; like other Sea Kings they have a rescue winch and could provide SAR for downed aircrew in their operating area. They have proved flexible in their ability to operate from a variety of platforms although it has made sense to keep them in the carrier with its command, control and communications systems.

## The CERBERUS Mission System

The AEW 2 was, in broad terms, an 'improved Gannet' and the need to replace its role equipment was recognised 10 years ago. A team of specialists, including former 849 observers, was brought together to specify and manage the project which was given the project name 'Cerberus'<sup>(\*)</sup>. An industrial group, now part of Thales, was given the contract to build the new system and modify airframes to take it. Constant communication ensured at every stage that Cerberus was fully relevant in the evolving modern battlespace, that it continued to be what the customer wanted and that it had sufficient space built into the system for the expansion that is bound to be required in a long service life. Up to three serving officers from 849 Squadron worked within the project to ensure that the Human Control Interface (HCI) was as good as it could be. The result has been a project delivered on time and on cost, which has moved smoothly into operational service. At the same time, it has offered such a massive leap forward in the capability of 849 that the designation AEW was no longer adequate. Instead the designation Airborne Surveillance and Control (ASaC) was allocated to the Mark 7 so that battlespace commanders will better understand its range of capabilities.

## The Sea King Mk 7 ASaC

The use of mature Sea King airframes took risk out of the project but the radar at the heart of the aircraft's system is the 'state-of-the-art' Searchwater 2000AEW, a derivative of the radar designed for the Nimrod MRA 4 upgrade. This is a pulse doppler or pulse radar with increased transmitter power. It offers over land tracking, clutter suppression and both air and surface tracking in a single sortie. Fully integrated colour displays have replaced black and white screens and each of the two observers can set up the display to reflect his, or her, own preferences for a particular task. Options include map overlays, danger areas, display range and even the particular colour for individual symbology. The processing behind the system is awesome, with automatic tracking of up to 250 air and surface contacts and it can even differentiate between contacts in close formation. In addition to its own initiated tracks, the Mark 7 is able to receive about 300 link tracks, so that total area coverage can be achieved.

The system is able to carry out concurrent air and surface searches and uses the Joint Tactical Information Distribution System (JTIDS) or Link 16 to disseminate information, in real time, to warships, airborne command and control platforms and fighters. Units without Link 16 equipment should be able to receive information over the older Link 11 through a data-forwarding unit. Battlespace commanders are, thus, able to see a picture that was previously only available when an E-3 AWACS aircraft was on task and not always then. The coverage provided by a single Mark 7 will offer every

participating unit in an operation an unparalleled view of the operating environment.

Other important improvements include 2 ARC 164 secure UHF HQII radios, an AD3400 secure V/UHF radio and a Collins 618T HF radio. The navigation system is improved by an integrated GPS and the radar has an integrated Mark XII IFF (Identification Friend of Foe) interrogator. The ability to use all this new technology is enhanced by the 'friendliness' of the HCI. Each operator has two interactive panels to control the radar system together with a keyboard and a 'windows' based programme. The system is designed so that any function the operator desires can be reached in three key strokes and there is even a cryptically labelled WTFGO button. When this is pressed, intercept lines are drawn between fighters and targets so that the observer can instantly understand 'what is going on'. The Mark 7 retains the 'Orange Crop' passive electronic surveillance system of its predecessor and this is an area for potential improvement.



Four Sea King Mk-7 were deployed to Operation Iraqi Freedom onboard HMS ARK ROYAL. The new radar and processing technology made it possible for the Mk-7 to track moving land targets and downlink this information to ground commanders via Link 16. (RN)

## The new role

The Mark 2 "bag" radar was only capable of radiating a fixed beam at any given time. In the Mark 7, the scanner can change its tilt angle between each rotation and, in consequence, one scan can produce an elevated pulse envelope beam to locate medium to high contacts whilst the second scan emits a pulse doppler beam to track contacts within the radar horizon. A further scan can be included with different properties in order to maintain a plot on surface contacts. As soon as one gets airborne the quantum leap in capability is obvious. Instead of struggling to track a target through clutter on a black and white screen with a chinagraph pencil, three button presses can display the heading, Mode 'C' and groundspeed of every medium and high level aircraft between Paris and Carlisle. The ability to show targets over land will be an enormous benefit in littoral warfare and a future article in five years time may paint an even more remarkable picture of what this aircraft can do.

## Training

The first aircraft was delivered in March 2002 and a conversion 'package' began after initial acceptance to convert HQ and A Flight observers to the new system. The lack of an IFTU to iron out 'bugs' shows just how much was achieved by the Cerberus Team. Pilots have only had one extra knob to

get used to, apart from the new communications outfit, that is the radome raise/lower button on the cyclic pitch stick, a function formerly under the control of the observers in the Mark 2. By early 2003, 849A had completed its conversion and was able to embark four aircraft and an enhanced number of aircrew in HMS ARK ROYAL when she sailed for the Middle East in January 2003. 849B are converting to the new type at RNAS Culdrose with operational capability expected in the summer for service in HMS INVINCIBLE.

## The Future

The Mark 7 will be critical to the operational capability of the INVINCIBLE class CVS aircraft carriers for the remainder of their service lives since there is no other practical means of deploying ASaC assets in them. The type is, therefore, likely to remain in service until 2015 when the new aircraft carrier, CVF 02, joins the fleet and ARK ROYAL, by then 30-years-old, pays off for the last time.

The Maritime Airborne Surveillance and Control (MASC) Project has been set up to identify a future platform to provide capability in the future carriers, the first of which is to be operational on 2012. The best and most obvious choice for the role is the E-2C Hawkeye 2000. In no particular order, other contenders are a modification of the V-22 Osprey and a derivative of the Merlin helicopter. The CVF is easily big

enough to operate the Hawkeye but in its initial “adaptable” form it will have a ski-jump rather than catapults and arrestor wires. Hawkeyes demonstrated the ability to launch from low ski-jump angles during trials at NAS Patuxent River in the 1980s but their operation without catapults and wires is questionable. The second CVF may well be fitted with electromagnetic catapults and arrestor wires after their technology is expected to mature for the USN’s CVN-21 in 2014. A phased introduction would be possible, therefore, with the Mark 7 remaining in service until then. By then some of its airframes will be more than 45-years-old. Both the alternatives would need significant development funding but the retention of the Cerberus system would minimise initial cost if vertical take off and landing proved to be the only option. One advantage of the adaptable carrier design is that a decision on the way forward does not have to be taken for several years. For the immediate future, therefore, the new system in its aged airframe will be the forefront of British maritime operations.

<sup>(\*)</sup>In Greek mythology Cerberus was a ferocious three-headed dog that guarded the underworld and was a faithful servant of Hades. He was one of the offspring of Echidna, a monster that was half woman and half serpent and Typhaon, father of hurricanes. His siblings were Hydra and Chimera. His task was to guard the entrance to Hades, giving a friendly welcome to all who entered but seizing and returning those who attempted to leave, in effect a sort of non-



The only change in the cockpit from an ASW to an AEW/ASaC Sea King is a small knob on the collective control to swing the ‘bag’ up for landing. (RN)

# The Last Gunfight

## Part 2

*By Ian Johnson*

**The Battle of Surigao Strait was the first of a four-part act that made up the Battle of Leyte Gulf, the largest naval battle in history. On a moonless night on 24 October, 1944, in the waters between the islands of Leyte and Mindanao in the Philippines, the last battleship versus battleship engagement in history was fought. Before dawn on the 25 October, a way of fighting that began in the 15th century, of gunnery duels between ships, often within sight of each other, would disappear. Ian Johnson continues the story from the point the Japanese C Force was engaged by DESRON 54.**

As the Japanese sailed on, three battle lines were formed at the eastern entrance of Surigao Strait. The first line was commanded by RADM Berkey and consisted of the cruisers USS PHOENIX, BOISE and HMAS SHROPSHIRE. Six miles east of Berkey was RADM Oldendorf with the cruisers USS LOUISVILLE, PORTLAND, COLOMBIA, MINNEAPOLIS, and DENVER. Four miles behind and in the gap made by Oldendorf and Berkey's cruisers was RADM Weyler's battle line of USS MISSISSIPPI, PENNSYLVANIA, MARYLAND, TENNESSEE, CALIFORNIA, and WEST VIRGINIA. As reports of the battle continued, TENNESSEE, CALIFORNIA, and WEST VIRGINIA, which were equipped with the latest fire control radars, began to detect the remains of 'C' Force, which by 0323 was at a range of 33,000 yards (30.1 kilometres). From MISSISSIPPI, RADM Weyler changed the battle plan and ordered his battleships to fire when the enemy was within 26,000 yards (27.7 kilometres) with armour piercing shells.

At 0323hrs, and as the last of DESRON 54's destroyers withdrew, destroyers from DESRON 24 began their attack. With the explosion of YAMAGUMO lighting up the area, Commander Buchanan led his ship HMAS ARUNTA and the destroyers USS KILLEN (DD-593) and USS BEALE (DD-471) through a heavy barrage of fire. ARUNTA launched four torpedoes at SHIGURE from a range of 6,500 yards (5,943 metres), but all of them missed the destroyer. BEALE fired five

torpedoes at YAMASHIRO and missed, while KILLEN also fired five torpedoes at YAMASHIRO at 8,700 yards (7,955 metres), with one hitting the battleship, slowing her to a speed of 5 knots for a short time, before she regained her pace.

The other ships of DESRON 24, USS BACHE (DD-470), USS DALY (DD-519) and USS HUTCHINS (DD-476) made unsuccessful torpedo attacks from ranges up to 10,500 yards (9,600 metres). HUTCHINS was the first destroyer to be fitted out with a Combat Information Centre (CIC) and this was the first time it had been used in battle conditions. As the battle raged around them, HUTCHINS' CIC informed the rest of DESRON 24 of the situation, while the destroyer's accuracy improved with the new fire control data from the CIC.

Nishimura radioed VADM Shima and VADM Kurita at 0330hrs: *"Urgent battle report number 2. Enemy torpedo boats and destroyers present on both sides of northern entrance to Surigao Strait. Two of our destroyers torpedoed and drifting. YAMASHIRO sustained one torpedo hit but no impediment to battle cruising."*

'C' force was now down to a damaged battleship YAMASHIRO, the cruiser MOGAMI and the destroyer SHIGURE. In true Japanese fashion, the three ships continued towards the heavy guns waiting at the eastern end of the strait.

For RADM Oldendorf, the losses so far were one PT Boat damaged against the enemy total of one battleship and two destroyers sunk, with one destroyer heavily damaged and one



The US cruiser USS BOISE. BOISE formed part of the first line of ships positioned to counter the Japanese advance down the strait. It was commanded by RADM Berkey and apart from BOISE, consisted of the cruisers USS PHOENIX and HMAS SHROPSHIRE.

lightly damaged battleship. At 0335 as DESRON 24 was pressing home its attack, Oldendorf ordered DESRON 56 into the fray.

At 0340 HUTCHINS, DALY and BACHE opened fire on the crippled MICHISHO and ASAGUMO. On the western horizon, three explosions marked the beginning of the end for the battleship FUSO. After MELVIN's torpedo strike, her crew fought to contain the damage but the fires onboard reached the ammunition magazines. The resulting explosion broke FUSO in half.

Believing his mission was completed, RADM Berkey ordered DESRON 24 to "Knock it off" and withdraw at 0349hrs. As the orders were received HUTCHINS fired a salvo of five torpedoes at the barely moving ASAGUMO, which managed to evade them. All five however, hit the drifting MICHISHO which promptly blew up and sank quickly. BACHE, DALY and HUTCHINS then withdrew.

At 0351, YAMASHIRO, MOGAMI and SHIGURE were 15,600 yards (14.2 kilometres) from Oldendorf and Berkey's cruisers. Oldendorf ordered both cruiser battle lines to open fire. RADM Oldendorf's is quoted in his after action report; "Every ship in the flank forces and the battle line opened up at once, and there was a semi-circle of fire which landed squarely on one point, which was the leading battleship. The semi-circle of fire so confused the Japanese that they did not know what target to shoot at." Over the next twenty minutes Oldendorf's ships and men, including many Pearl Harbor veterans, gained their revenge. Three thousand heavy projectiles, including 14 and 16-inch shells slammed into, and dropped around the three Japanese ships.

For Nishimura, after the PT Boats and the destroyer attacks, there was nothing more he could do. One moment in front of him there was nothing on the horizon, either visually or on the fire control radar, which by now was affected by multiple returns reflected off the land on either side of the strait to be effective. The next moment, the horizon lit up as Oldendorf's heavy ships began their attack with full broadsides. At 0352hrs, Nishimura ordered FUSO to make best speed, not realising that the ship was lost. Nishimura's final



The RAN cruiser HMAS SHROPSHIRE. During the battle she was able to fire two 8-inch broadsides a minute at the Japanese battleship YAMASHIRO.

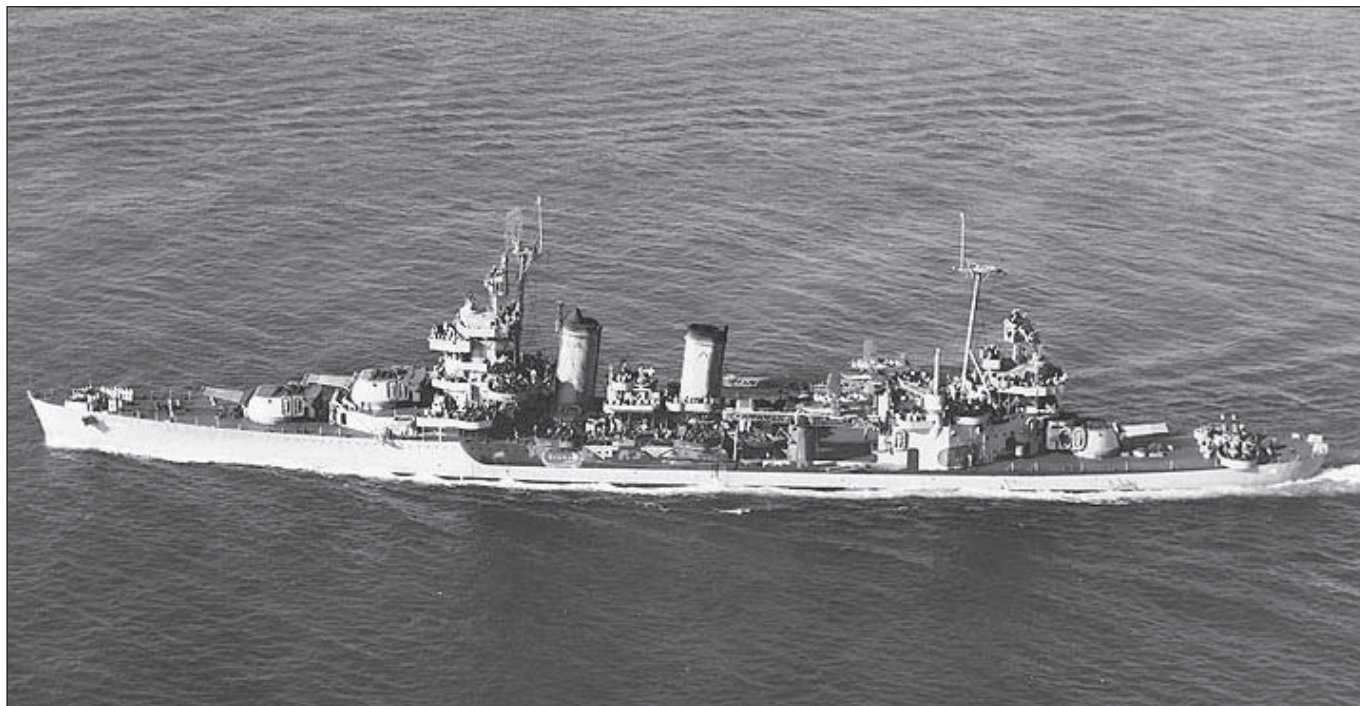
order to his battered fleet was; "You are to proceed to attack all ships."

YAMASHIRO by this time was running at 12 knots and engaging targets visually. The battleship became the first target of the cruisers. DENVER opened fire, followed by PORTLAND, COLOMBIA, LOUISVILLE, and MINNEAPOLIS.

The battleships were now passing ahead of the enemy column in the classic crossing the 'T' manoeuvre. WEST VIRGINIA, with the latest Mk-8 fire control radars, opened fire on YAMASHIRO at 0353hrs, firing ninety-three 16-inch shells before stopping. Shortly after, the first salvo reached the YAMASHIRO, killing Vice Admiral Nishimura. The cruisers PHOENIX, and BOISE then joined in, targeting YAMASHIRO, with RADM Berkey informing BOISE to slow her rate of fire to conserve ammunition.

At 0355 TENNESSEE and CALIFORNIA opened fire, the two battleships firing six round salvos from their main guns. One hundred thirty two 14-inch shells were expended between them before they too stopped firing. The three remaining battleships, MISSISSIPPI, MARYLAND and PENNSYLVANIA, with older fire control radars, were having trouble with their ranging.

The nine destroyers of DESRON 56 entered the battle. Between 0354 and 0359hrs, six destroyers launched over twenty torpedoes at ranges up to 8,000 yards (7,315 metres) without success, then withdrew under fire.



The US Cruiser USS MINNEAPOLIS. MINNEAPOLIS was part of the second line in company with the cruisers USS LOUISVILLE, PORTLAND, COLOMBIA and DENVER.

HMAS SHROPSHIRE was having trouble with her fire control system. However, along with PHOENIX, and BOISE, she conducted a formation turn towards the west and finally opened fire with her 8-inch guns at 0356hrs. SHROPSHIRE's Commanding Officer, Captain Nicholls in his after action report stated "A very high rate of fire was attained in rapid salvos; as many as eight broadsides in two minutes being fired."

For the DENVER another target came into view, she shifted fire to SHIGURE at 0358hrs, and continued to fire. By now the range had decreased between Oldendorf's heavy units and the YAMASHIRO, MOGAMI and SHIGURE. As the fire from Oldendorf's ships increased in accuracy, the three ships to the southwest began to withdraw. YAMASHIRO and MOGAMI had suffered moderate damage while concentrating their fire on the closest US cruisers, while remarkably the SHIGURE had only received one hit from a dud 8-inch shell.

At 0359hrs the battleship MARYLAND, using the WEST VIRGINIA'S fall of shot (and the large columns of water they created) engaged, firing 48 rounds. MISSISSIPPI's fire control radar only allowed her one targeted salvo against the three ships. The fire control radar on PENNSYLVANIA refused to lock onto anything and was the only battleship not to fire a shot.

MOGAMI had taken heavy damage, and while the crew raced to repair damage all over the ship, she fired torpedoes at the incoming destroyers of DESRON 56. That was the last attack MOGAMI made. At 0402hrs the cruiser PORTLAND fired a salvo of eight-inch shells at her, hitting the bridge and killing her captain, as well as hitting the engine room bringing her to a stop.

The remaining three ships of DESRON 56; USS ALBERT W. GRANT (DD-649) USS NEWCOMB (DD-586) and USS RICHARD P. LEARY (DD-664) began their attack at 0404hrs. The three destroyers followed YAMASHIRO, and paralleled the battleship after she turned to the southwest. At 6,200 yards (5,669 metres) RICHARD P. LEARY, NEWCOMB and ALBERT W. GRANT launched thirteen torpedoes.

The ALBERT W. GRANT was targeted by the YAMASHIRO and was fired on during her attack, receiving several hits. Eleven shells, believed to be fired from the cruiser DENVER, hit the ALBERT W. GRANT. The former had mistaken the destroyer for the SHIGURE. Thirty-four sailors were killed and ninety-four wounded. As word of the friendly



The Japanese battleship YAMASHIRO.

fire incident reached RADM Oldendorf at 0408hrs, he ordered all Allied ships to cease fire, to allow the destroyers to withdraw. NEWCOMB came to the aid of ALBERT W. GRANT and both ships sailed out of danger.



The battleship USS MISSISSIPPI.

As the cease-fire order came through, MISSISSIPPI fired a broadside at 19,700 yards (18 kilometres) at the retreating Japanese force. This became the last salvo fired in a battleship versus battleship action. As the distinguished American naval historian, RADM Samuel Eliot Morison, wrote of the battle; "In the unearthly silence that followed the roar of Oldendorf's 14" and 16" guns in Surigao Strait, one could imagine the ghosts of all great admirals, standing at attention to salute the passing of a kind of naval warfare they all understood. For in the opening minutes of 25 October 1944, the Battle Line became as obsolete as the row-galley tactics of centuries before."

DESRON 56's nine destroyers fired multiple torpedoes during the attack, and two from NEWCOMB hit Nishimura's flagship at 0411, stopping her dead in the water. The torpedo hit, on top of the damage inflicted by the cruisers and battleships, was too much for YAMASHIRO, which rolled over and sank at 0419hrs.

RICHARD P. LEARY'S crew spotted torpedoes in the water at 0413. These were fired from MOGAMI and passed close to the destroyer as she was heading towards the battleships.

MOGAMI and SHIGURE were not idle during Oldendorf's cease-fire. MOGAMI was ablaze from bow to stern while SHIGURE was lightly damaged. The two ships turned west to escape the Allied battle lines, SHIGURE moving at 33 knots to avoid the fate of the rest of 'C' Force.

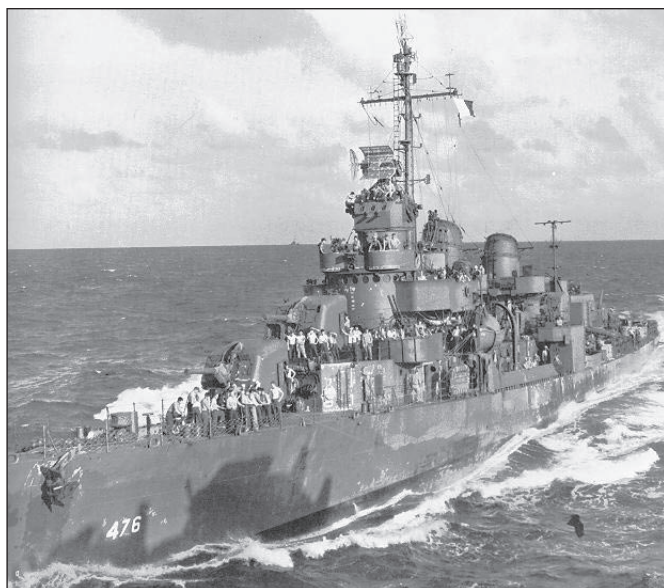
By 0418 hrs, RADM Weyler ordered the battleships MISSISSIPPI, MARYLAND and WEST VIRGINIA to head north and PENNSYLVANIA, TENNESSEE, and CALIFORNIA south to avoid the incoming torpedoes fired by MOGAMI. By 0419 hrs Oldendorf ordered his battleships and cruisers to fire after the destroyers were clear, but the battleships were out of range of the fleeing MOGAMI and SHIGURE. By 0420hrs 'C' Force ceased to exist. FUSO had broken her back and was sinking. YAMASHIRO had rolled over and sank with 1200 members of her crew. Three destroyers were either sunk or sinking.

The 'Second Striking Force' was now in Surigao Strait and heading east at full speed, unaware of the fate of Nishimura's fleet. VADM Shima found out when a torpedo fired from PT-137, just before 0300hrs missed its original target of a destroyer and hit one of his cruisers. The ABUKUMA was struck, causing moderate damage and was forced to stop. At 0430hrs while heading east, Shima's fleet saw what they thought were three ships through heavy smoke. It turned out to be the two halves of FUSO and the wounded MOGAMI making her way west. At that moment NACHI'S fire control radar showed two destroyer size contacts. Believing they were real, NACHI fired 16 torpedoes at the contacts. All 16 torpedoes hit an island and exploded. As this was happening NACHI rammed MOGAMI, causing serious damage to both ships. VADM Shima had had enough, and with MOGAMI trailing he ordered the surviving five destroyers of 'Second Striking Force' west, away from the approaching battleships and cruisers, and the breaking dawn.

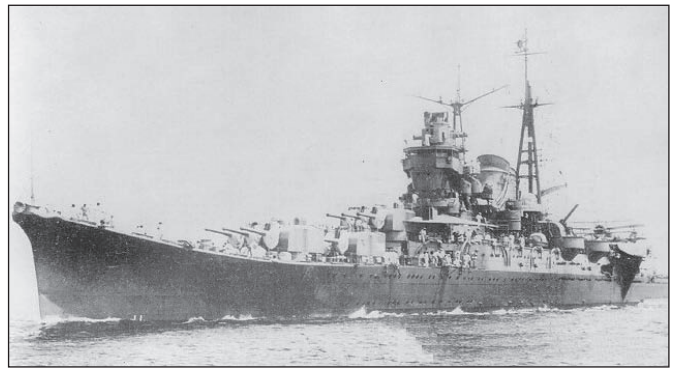
But as the survivors headed west, the threat changed from the heavy guns to aircraft. Carrier aircraft attacked NACHI and MOGAMI four hours after their collision, and MOGAMI was sunk. The next day near Los Negros, carrier aircraft sank ABUKUMA. NACHI fell to carrier aircraft on 5 November in Manila Bay.

The Battle of Surigao Strait was over as dawn broke on 25 October. While units of the 7th Fleet battled for their lives against Vice Admiral Kurita's 'A' Force at Leyte Gulf, and ADM Halsey went after Osawa's decoy force, RADM Oldendorf's task force headed west through the strait, looking for survivors. Many Japanese in the water refused to be rescued by Allied warships. Apart from the friendly fire incident with the ALBERT W. GRANT, the only loss was a PT boat lost during the 0300hr attack on the 'Second Striking Force'. Both HMA Ships SHROPSHIRE and ARUNTA came through the battle unscathed and with a new battle honour, 'Leyte Gulf, 1944'.

For the Japanese, the Battle of Surigao Strait was a total defeat, with the loss of every ship in Vice Admiral Nishimura's 'C' Force except SHIGURE, and the failure to attack the invasion fleet at Leyte Gulf. The Japanese defeat at Surigao Strait, along with those at the Battle of the Sibuyan Sea, the



The Fletcher class destroyer USS HUTCHINS. HUTCHINS was the first destroyer to be fitted out with a Combat Information Centre (CIC). As the battle raged HUTCHINS' CIC was able to keep the rest of DESRON 24 informed about the battle.



The Japanese Cruiser MOGAMI.

Battle of Samar Island and the Battle of Cape Engano, was the last time the Imperial Japanese Navy conducted fleet size operations.

After the Battle of Leyte Gulf, there were many questions. Why did ADM Halsey take the whole of the 3rd Fleet, including RADM Lee's battleships, to destroy aircraft carriers that were essentially non-operational due to lack of aircraft, while leaving the invasion fleet wide open? Why did ADM Kurita turn his ships around when he had the 7th Fleet at his mercy? How could crews on small destroyer escorts show extraordinary courage and fury in attacking Japanese battleships armed with guns ranging from 12 to 18-inches and manage to turn the battleships away from the lightly armoured escort carriers?

No questions were asked when it came to RADM Oldendorf and his plans and actions at Surigao Strait. The destruction of 'C' Force by Oldendorf and his ships were textbook manoeuvres of the ages, from 'Line Ahead' to 'Crossing the 'T'', but it was the last time battleships would make them. From now on the new Master of the Seas would be the aircraft carrier.

After Surigao Strait, the use of the battleship as a front line warship would disappear. By the 1950s they would be relegated to shore bombardment and at the end of the decade no country had a battleship in service. The USN's battleships would be seen again with the recommissioning of IOWA class battleship USS NEW JERSEY (BB-62) and her deployment during the Vietnam War. As part of Ronald Regan's 600-ship Navy plan in the 1980s all Iowa class battleships would be recommissioned with two seeing combat during Operation Desert Storm, not only on the shore bombardment role, but as missile platforms for the Tomahawk cruise missile.

Surigao Strait was a defining moment in naval warfare. The Falklands Conflict of 1982 showed the horrors of missile and bomb strikes against the modern warship. Yet during the Surigao Strait battle the true horror of heavy calibre gun duels in naval warfare was seen, possibly for the last time. The damage inflicted on YAMASHIRO and MOGAMI by Jesse Oldendorf's battle line of 14 and 16-inch guns was as devastating as the close quarters action of Nelson's fleet against the French at the Battle of the Nile in 1798, and just as decisive as the Japanese victory against the Russians at the Battle of Tsushima in 1905.

It is fitting that the last gunfight in which battleships would engage each other happened as part of a classic surface-to-surface action during the largest naval battle the world has ever seen. It is also fitting that these leviathans, as well as the history of their battles, can be seen not just as dive wrecks, but also as part of several museums worldwide.

# PRODUCT REVIEW

## U.S. DESTROYERS AN ILLUSTRATED DESIGN HISTORY

*Revised Edition*

*By Norman Friedman*

*Ship plans by A.D. Baker III*

*Peribo Books, 58 Beaumont Road, Mt. Kuring-Gai, NSW*

*Reviewed by Vic Jeffery*

Published in August 2004, *US Destroyers* is a magnificent 552-page reference work detailing the history and development of United States Navy destroyers.

This revised larger book supersedes the original 1982 published 489-page edition and covers the two decades since, including the design evolution of the backbone of the U.S. Navy destroyer force of today, the DDGs of the *Arleigh Burke*-class.

Author Dr Norman Friedman is an internationally known strategist and naval historian and the author of nearly 30 books, including seven other titles in this design history series of U.S. Navy warships.

I believe the Americans build a very good destroyer with all the right characteristics, i.e. Heavily armed, fast, manoeuvrable and able to absorb a good deal of punishment. This was evidenced by the damage absorbed by some of their World War Two destroyers hit by Japanese *Kamikaze* aircraft and some of their post-war ships, which were relegated to targets in recent years.

Commencing with the diminutive four-funnelled USS *Bainbridge* (DD-1) commissioned on 15 August 1899, it covering more than 1,000 American ships through to today's large highly sophisticated guided-missile destroyers.

Supporting the highly-detailed and informative text are 263 quality back-and-white photos and 106 superb high-quality line drawings and plans by the respected A.D. (Dave) Baker III, not only a renowned illustrator, but also a naval expert and for many years, editor of the authoritative naval reference work, *Combat Fleet of the World*.

Certainly not a dull reference book, *US Destroyers* is well presented and written in a most informative and entertaining format.

The book is divided into 17 lengthy chapters commencing with Chapter One: *Prologue: Torpedo Boats into Destroyers, 1886-1898* and concluding with a chapter titled *A Post-Cold War Destroyer*. Among the other chapters are: *The Mass Production Destroyer, 1917-1922*, *To the Big Destroyers, 1941-1945*, *Destroyer ASW: World War II and After*, *The Fast Task Force Escorts* and *Nuclear Destroyers and Frigates*.

*US Destroyers* is unique as it is the only history on the subject based on internal, formerly classified papers of the United States Navy. Some 89 pages of *Notes to Tables* and five pages of *Notes on Sources* complete this valuable reference and history book, which would have seen countless hours devoted to its compilation.

Published by the United States Naval Institute Press, this hard cover book is understandably not cheap, retailing at \$190.00. However on the other hand, for a reference work of this magnitude, the price is extremely reasonable.

## NORTH QUEENSLAND AT WAR (Day by Day)

**VOLUME 1**

*Naval and Shipping Movements (1939 – 1942)*

*By Peter Nielsen*

*Nielsen Publishing,*

*PO Box 7226, Garbutt B.C,*

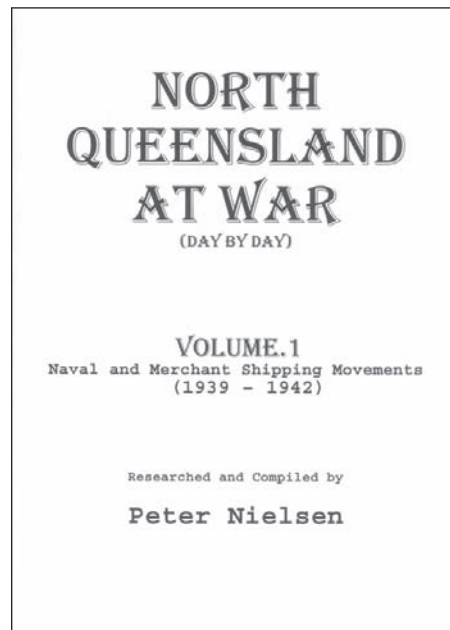
*Townsville QLD 4814*

*Ph (07) 4056 5400*

*Fax (07) 4056 5499*

*Softcover, B&W, text only*

*Reviewed by: Steve Bennet*



*NORTH QUEENSLAND AT WAR – VOLUME 1* is a 'diary' format book that comes close to an official history of shipping in North Queensland waters during 1939-1942 (99% of vessel movements sourced from Australian Archives written records).

As a purely 'reference document' it will be of value not only to those interested in a slice of Australian maritime history, but also to those people who served on, or may have been one of the hundreds of thousands of Allied servicemen and women that were embarked on vessels (large and small, Merchant and Naval) that frequented North Queensland waters during WW II.

Apart from recording the movements of merchantmen on the coastal trade carrying supplies or troops bound for (or returning from), Darwin or New Guinea, or, other theatres of war in the South West Pacific Area; it also includes the movements of allied warships and those on Mine laying duties, convoy escort duties and those that made up the Australian Naval Task Force – which between Coral Sea patrols took refuge within the Great Barrier Reef, Cid Harbour, Dunk Island, Challenger Bay and Stanley Island.

The book is comprehensive in the data it contains in its 306 pages of text. A total of 411 vessels are listed in the Ship Index, and basic details of each are annotated at the first mention in the text.

Volume 2 of *NORTH QUEENSLAND AT WAR* will cover



1943 with Volume 3 covering 1944 – 1946.

This Limited Edition book is available only from Nielsen Publishing for \$69, plus \$8 p&p.

## THE AIRSHIPS

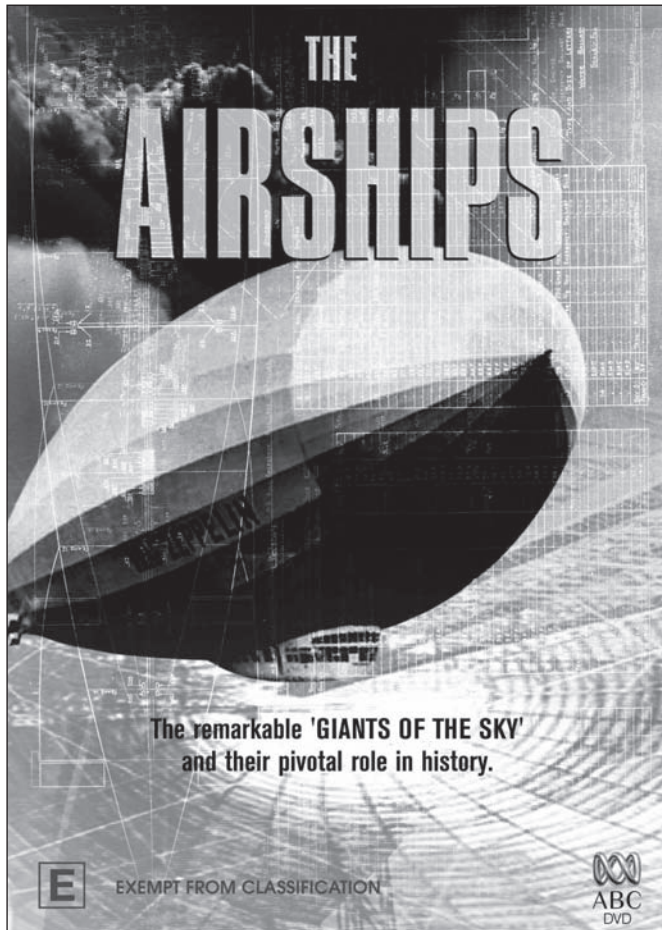
3-Part TV Documentary

Video and DVD

Roadshow Entertainment and ABC Video

RRP: \$29.95

From the makers of magnificent documentaries The Liners



and The Battleships comes a new three-part series on a much misunderstood and forgotten vehicle of peace and war, the airship, still the largest flying object made by man.

The three episodes of this documentary span from 1890 to the present day and reveals, for the first time for many, the dynamic role the airship has had in history.

The airship was, for a while, the test of a nation's control of the air and the air power race to dominate the skies. Airships pioneered aerial bombing, reconnaissance, conducted the first round the world trip by air, established the first air-air link between Europe and the New World, flew explorers to the North Pole and conducted very effective anti-submarine missions and logistics operations for the US during WW II. Despite being an air asset most military airships belonged to navies.

But the airship will always be remembered in terms of the Hindenberg disaster of the 1930s. This unrepresentative incident plagued the further development of the airship, until today.

Apart from the fascinating history of the airship, this

documentary series also explores the resurgence of the airship as a reusable satellite, a persistent airborne command and control post, an airborne early warning and control asset, a flying destroyer and an aircraft able to transport cargoes by air never before dreamt of in the past.

*THE AIRSHIPS* is a fascinating insight into this almost forgotten era of aviation and its role in the history of the world.

## NO PLEASURE CRUISE

*The Story of the Royal Australian Navy*

By Tom Frame

Soft Cover. 336 pages.

Published by Allen & Unwin

Cost \$35.00

Reviewed by Ian Johnson

From the author of 'Pacific Partners' and 'Where Fate Calls' comes another book of the history of the Navy of Australia, both Colonial and Commonwealth.

While most of the information in this book has been published countless times elsewhere, Tom Frame seems to have a knack of discussing new points of view in his books and, with the help of the many quotes in the book, puts the reader into the military and political arena that the Royal Australian Navy has operated over the years. The highlight for the reader will be the post 1990 chapters as this might be the first book to bring information on these operations to light in a easily readable form, warts and all. From maritime intercept operations during Operation Desert Shield to 9/11 and the War on Terrorism, the reader is walked through most of the major military actions the RAN has participated in, including East Timor and the Solomon Islands. 'Children Overboard', TAMPA and the War in Iraq are also featured. One of the more interesting insights the book brings is the pressure that the Officers and Sailors of the RAN operate under in the current political environment and how mistakes can destroy careers.

This book comes highly recommended for those interested in the Royal Australian Navy. Another quality book from Mr. Frame. (His 15th!)

# STATEMENT of POLICY

Navy League of Australia

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 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 a close relationship with the nearer ASEAN countries, PNG and the Island States of the South Pacific.
- Advocates a defence capability which is knowledge-based with a prime consideration given to intelligence, surveillance and reconnaissance.
- Advocates the acquisition of the most modern armaments and sensors to ensure that the ADF maintains some technological advantages over forces in our general area.
- Believes there must be a significant deterrent element in the Australian Defence Force (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 highly mobile Army, capable of littoral and jungle warfare as well as the defence of Northern Australia.
- Supports the development of amphibious forces to ensure the security of our offshore territories and to enable assistance to be provided by sea as well as by air to friendly island states in our area.
- Endorses the transfer of responsibility for the co-ordination of Coastal Surveillance to the defence force and the development of the capability for patrol and surveillance of the ocean areas all around the Australian coast and island territories, including the Southern Ocean.
- Advocates measures to foster a build-up of Australian-owned shipping to ensure the carriage of essential cargoes in war.
- Advocates the development of a defence industry supported by strong research and design organisations capable of constructing all needed types of warships and support vessels and of providing systems and sensor integration with through-life support.

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 to

ensure that, in conjunction with the RAAF, this can be achieved against any force which could be deployed in our general area.

- Is concerned that the offensive and defensive capability of the RAN has decreased markedly in recent decades and that with the paying-off of the DDGs, the Fleet will lack air defence and have a reduced capability for support of ground forces.
- Advocates the very early acquisition of the new destroyers as foreshadowed in the Defence White Paper 2.
- Advocates the acquisition of long-range precision weapons to increase the present limited power projection, support and deterrent capability of the RAN.
- Advocates the acquisition of unmanned surveillance aircraft such as the GLOBAL HAWK primarily for offshore surveillance.
- Advocates the acquisition of sufficient Australian-built afloat support ships to support two naval task forces with such ships having design flexibility and commonality of build.
- Advocates the acquisition at an early date of integrated air power in the fleet to ensure that ADF deployments can be fully defended and supported from the sea.
- Advocates that all Australian warships should be equipped with some form of defence against missiles.
- Advocates that in any future submarine construction program all forms of propulsion be examined with a view to selecting the most advantageous operationally.
- Advocates the acquisition of an additional 2 or 3 updated Collins class submarines.
- Supports the maintenance and continuing development of the mine-countermeasures force and a modern hydrographic/oceanographic capability.
- Supports the maintenance of an enlarged, flexible patrol boat fleet capable of operating in severe sea states.
- 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 in reserve, or taken up for service, 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 current economic problems and budgetary constraints, believes that, given leadership by successive governments, Australia can defend itself in the longer term within acceptable financial, economic and manpower parameters.

France's new Mistral class (Force Projection and Command vessel) after launch. The Mistral class is one of two contenders for the RAN's new Amphibious requirement for two large LHD (Landing Helicopter Dock) ships. In her current form, MISTRAL is smaller than the ADF's requirement. French shipbuilder DCN has thus offered a larger variant of the ship. (DCN)



France's new Mistral class (Force Projection and Command vessel) being manoeuvred to DCN's fitting out wharf. (DCN)



First images of the new Harpoon fitment to the RAN's Anzac class frigates. HMAS WARRAMUNGA was the first Anzac to undergo the fit out while at HMAS STIRLING in WA. The positioning is reminiscent of the RN's Type 21 frigates before being sold to Pakistan.



A close up of the empty tubes of a Mk-141 Harpoon launcher on HMAS WARRAMUNGA. The usual position for the two Mk-141 octuple launchers for Harpoon on the MEKO 200 design is between the bridge and the funnels however, top weight restrictions on the RAN's MEKOs mean that they are being placed lower down on the superstructure to aid sea keeping.