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THE NAVY

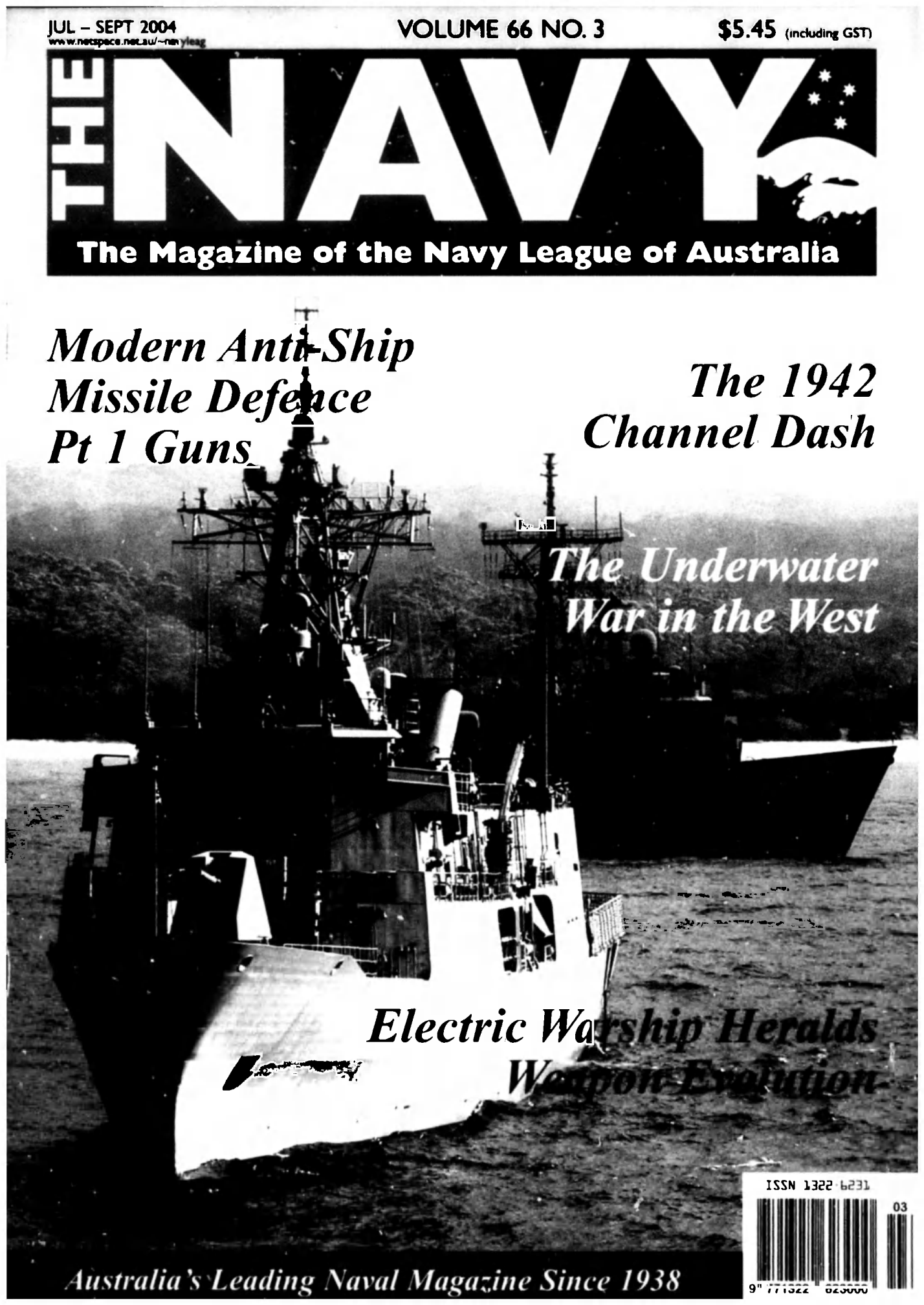
The Magazine of the Navy League of Australia

Modern Anti-Ship Missile Defence Pt 1 Guns

The 1942 Channel Dash

The Underwater War in the West

Electric Warship Heralds Weapon Evolution



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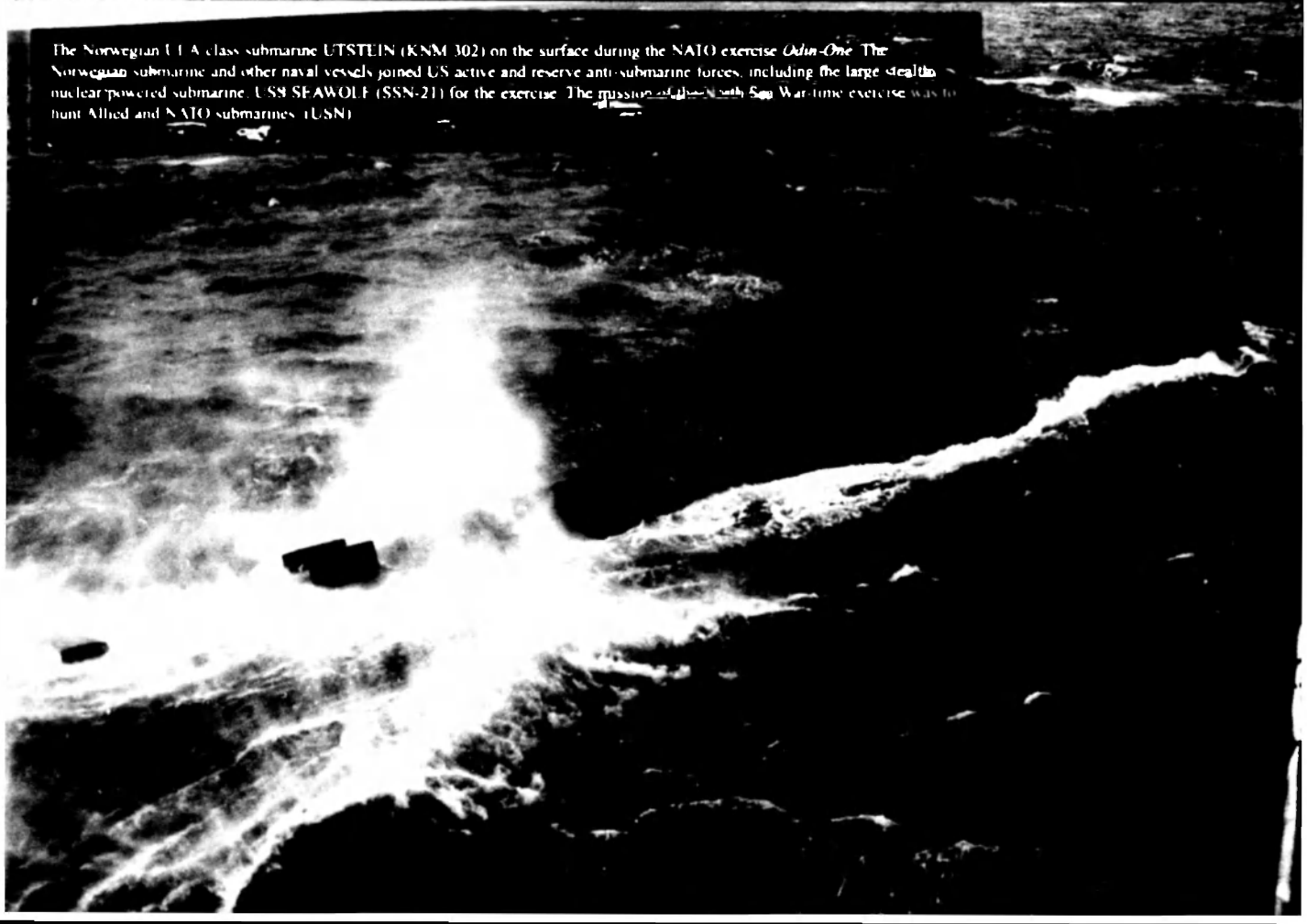
03

Australia's Leading Naval Magazine Since 1938

USS KITTY HAWK (CV-63) and embarked Carrier Air Wing Five (CVW-5) pull into Fremantle for a five-day port call. This was KITTY HAWK's fifth visit to Fremantle and the ninth for CVW-5. KITTY HAWK is one of two remaining conventionally powered aircraft carriers in the U.S. Navy, and is currently homeported in Yokosuka, Japan. She recently celebrated her 43rd birthday (see Flash Traffic section in this edition for details). (USN)

The Norwegian ULA class submarine UTSTEIN (KNM 302) on the surface during the NATO exercise *Odin-One*. The Norwegian submarine and other naval vessels joined US active and reserve anti-submarine forces, including the large stealth nuclear-powered submarine, USS SEAWOLF (SSN-21) for the exercise. The mission of the North Sea War-time exercise was to hunt Allied and NATO submarines. (USN)



THE NAVY

Volume 66 No. 3

Contents

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Front cover: HMNZS TE KAHA with HMAS CANBERRA in the background both at anchor in Jervis Bay on the NSW South Coast during Exercise Ocean Protector. (RAN)

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"STAR WARS"

In an article headed "TBMD and the RAN" published in the July–September 2000 issue of *THE NAVY*, Mark Schweikert reported on theatre ballistic missiles which had proliferated and with their great range posed a potential danger for particularly every country in the world. The author described measures being taken by various countries to counter the threat including a possible role for the Royal Australian Navy's planned air-warfare destroyers, a role that could well provide the RAN with an opportunity to destroy an incoming ballistic missile.

It is unnecessary to repeat here the technical aspects of anti-missile defence described in *THE NAVY* article nor to comment on media speculation on the subject – often referred to as *"STAR WARS"*. Two questions however, come to the mind and seem not to have received adequate attention:

If an incoming object is located and thought to be a hostile ballistic missile, who gives the order to discharge an anti-missile device? Given the need for a quick decision, is the operator of the detection equipment who happens to be on duty expected to assume responsibility for possibly starting a major war?

Assuming the object is in fact a hostile missile and it is disabled or destroyed, what happens to the contents of the warhead if they happen to consist of nuclear or bacterial materials? Are they incinerated, do they float around forever or simply descend on some unfortunate country below?

At times one is tempted to think mankind is determined to obliterate itself – all in the name of progress.

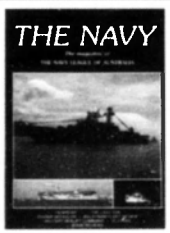
THE MELBOURNE/VOYAGER COLLISION

The collision between the aircraft carrier MELBOURNE and the destroyer VOYAGER in February 1964 was a tragic event – for the men who lost their lives, their families and for many in the Royal Australian Navy who lost friends and shipmates. Apart from the loss of a valuable ship the reputation of the Navy also suffered in the aftermath of the collision and the two Royal Commissions into the disaster.

Unfortunately for the families of those who lost their life they have had little chance to put the tragic period behind them; media reports of court proceedings involving claims from former MELBOURNE personnel or published reports of conjecture as to the cause of the collision by people uninvolved in the event, are frequent reminders.

It is fair to say due to the death of the principal officers involved, either in the collision between MELBOURNE and VOYAGER or through the passage of time will never be known; this was accepted by the 2nd Royal Commissioners. Reminders in the form of court proceedings are probably inevitable in the coming months but conjecture in the future should surely be best left to the naval staff colleges.

Geoffrey Evans



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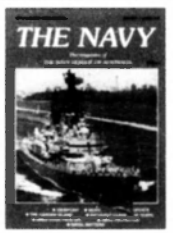
THE NAVY



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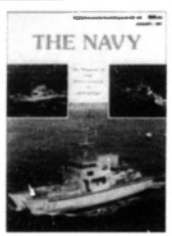
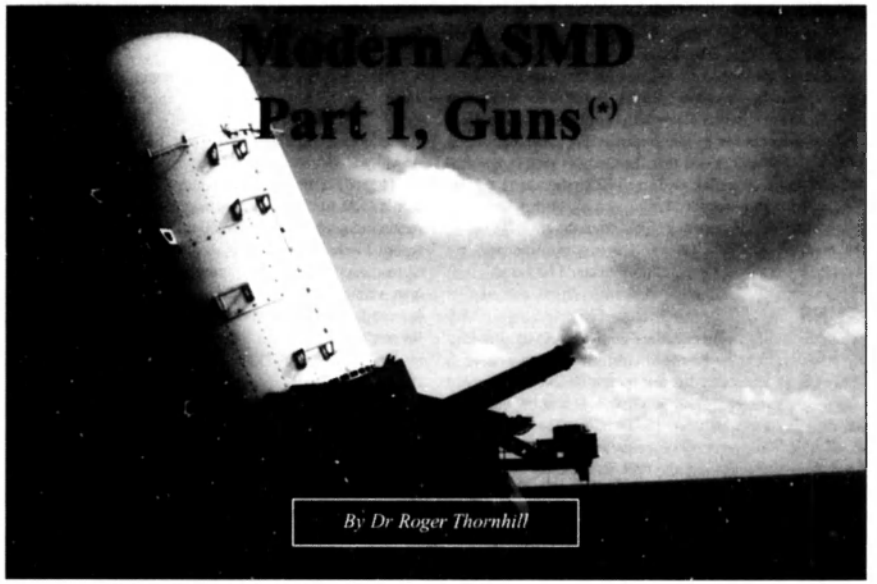
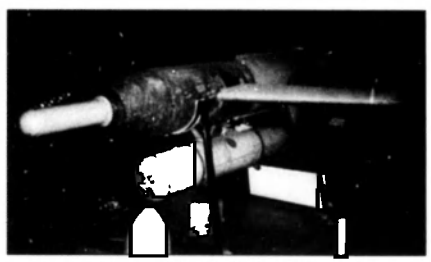




An early Mk.15 20mm Phalanx CIWS engaging a target. This version fires 3,000 rds/min and is the most widely used. (USN)

In Part 1 of our series on Anti-Ship Missile Defence, Dr Roger Thornhill examines the gun and its effectiveness in this role.

The threat posed by the dedicated anti ship weapon is not a new one. During WW II the Germans used several types of anti-ship glide bombs/missiles with varying degrees of success. They realised that in order to keep the attacking aircraft safe from a ship's numerous anti-aircraft guns, and score a hit, that standoff and precision were required. This idea spurned on a number of air-launched weapons, which in appearance, are not too dissimilar from the anti-ship missiles of today. The German's were initially able to produce the required precision by the aircraft's bombardier guiding the weapon from his position in the bomber's nose using radio signals or wires, which transmitted instructions to the weapon's control surfaces, which also enabled it to glide to the target. One version even employed a TV camera in its nose feeding images back to the bombardier who had a TV monitor in the aircraft for even greater accuracy. Most employed a small rocket motor for even grater standoff.



The Australian War Memorial's World War II HS-293. The HS-293 was a German rocket powered radio controlled glide bomb which provided standoff and precision to protect the launch aircraft from numerous, and sophisticated, ship borne anti-aircraft defences. (Mark Schweikert)

One of the first anti-ship successes of the radio controlled glide bomb, a Henschel 293, occurred on 27 August 1943. A patrolling Luftwaffe Dornier 217 which had recently been fitted to use the new 1,000lb precision anti-ship glide bomb found the British sloop HMS EGRET in the Bay of Biscay. It dropped its glide bomb, which from a safe distance, scored a direct hit and sank the sloop. Later versions of the 293 were fitted with rocket motors to provide even more standoff (The Australian War Memorial has one of these in its 'Annex' collection').

Despite the loss of the sloop EGRET the most quoted ASM (Anti-Ship Missile) success remains the Israeli destroyer EILAT's 1967 sinking at the hands of three Russian made, Egyptian fired, SS-N-2 Styx missiles. This was the first ASM attack where the weapon guided itself to the target. Quite rightly, this incident was seen as a turning point in naval warfare.

Three years after EILAT's sinking the USN, seeing the poignancy of the incident, issued a contract to General Dynamics to study the feasibility of a close-range gunnery system based on the 20mm Vulcan cannon. In 1973 the first prototype Close In Weapon System for the USN, the Phalanx, went to sea aboard the destroyer USS KING but it wasn't until 1981 that the first production mount went to sea. Anti-Ship Missile Defence (ASMD) was now starting to take shape.

Since the ASM attacks on HMS SHEFFIELD and USS STARK ASMD tactics and technology have developed at a faster pace and been categorised into hard and soft kill. Hard kill denotes the actual destruction of the incoming threat through either guns and/or missiles. Soft kill is designed to manipulate the missile's seeker into malfunctioning enough to produce inaccuracies in the guidance. For example, during WW II the allies realised that the German radio controlled anti-ship bombs/missiles used one of 18 channels in the 48-50MHz band. A powerful transmission along that frequency range would jam the steering signal from the aircraft sending the missile/bomb into the sea. This measure rendered the weapon useless until a countermeasure could be found.

GUNS

While the use of medium calibre guns for ASMD is a cost-effective solution the problem with using a gun system to destroy in incoming ASM is that it must be able to destroy or inflict serious damage on a relatively small, potentially manoeuvring and fast target. The main draw back of the gun in the ASMD role is that once the projectile has left the barrel it cannot be influenced by the firer. Its accuracy is governed by factors such as the precision of the tracking sensors, the dispersal pattern of the gun, the time of flight, firing platform motion and wind strength in-between the gun and the target. The target could also be manoeuvring violently, such as the 'corkscrew' manoeuvre of the new Russian SS-N-27 'Sizzler', in order to take advantage of the gun's limitations. Another draw back is the limited range of the gun which restricts it to the close in defence layer.

One of the counters to these problems is to throw a constantly moving radar controlled 'wall of lead' at the target through gun systems that have very high rates of fire with their own detection, tracking and ballistic computation systems. These systems are known by the abbreviation CIWS (Close In Weapon Systems). In the 'close in' role the CIWS is a very cost-effective defence particularly if other systems fail to negate the incoming ASM or are missing in a Navy's capability inventory. The CIWS can also keep firing and be effective when other hard kill ASMD systems cannot engage the threat due to proximity and 'safe arm distance' limitations. The CIWS can also engage many ASM targets due to the amount of ammunition it can employ, both on the mount and in storage on ship. For example, one magazine of gun ammunition for a medium calibre CIWS could potentially engage up to four ASMs with four magazines taking the same space as a single missile in the ship's storage compartment. It should also be noted modern CIWS can engage low flying aircraft attempting to drop 'dumb bombs' on the ship and that some CIWS are being modified to enable engagement of surface targets. The following is a short description of some of the leading CIWS available today.

The Mk-15 Phalanx

By far the most common and numerous CIWS is the Mk 15 Phalanx. Phalanx is a 'closed-loop' (that is, tracking both the target and the stream of rounds) weapon system designed to provide the last layer of hard kill defence against ASMs. The system consists of a stand-alone mount emplying a 20mm M61A1 Vulcan Gatling gun with a cylindrical magazine and feeding mechanism suspended beneath it and a detection and tracking radar unit above.

The radar is a pulse doppler sensor with a vertical tracking antenna at the front and a search antenna at the top. The system is capable of automatically searching, detecting, evaluating, acquiring, tracking and firing on an incoming ASM.

Targets can be detected at 3nm (5.6km) and acquired at 2.3nm (4.3km). Firing usually begins at 1nm (1.85km) with a maximum probable kill at 460m. System reaction time is reported to be approximately three seconds.

Although designed for autonomous missile engagement, later versions of Phalanx can be designated by other ship sensors through the command and weapon control system in the operations room.

Four versions of Phalanx have been made with others planned:

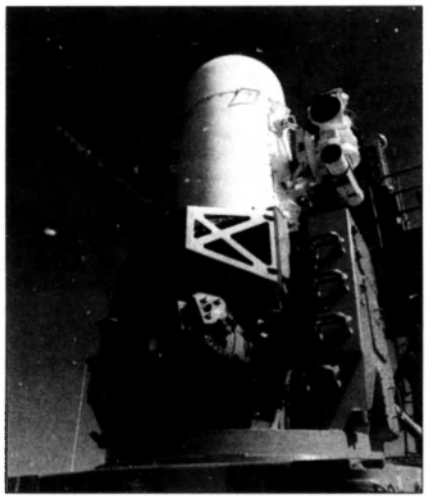
Block 0

This version features a 16-bit computer and a 980-round magazine. The hydraulically driven gun drive provides a rate of fire of 3,000rds/min. The search radar uses a horizontal antenna slaved to a vertical gyro to compensate for deck pitching.

Block 1

Baseline 0: This model has a new onboard computer and new search radar antenna. New circuitry has greatly improved reliability.

Baseline 1: The gun assembly in this model has a pneumatic gun drive which increases the rate of fire to 4,500rds/min. It has a 1,470-round magazine with tungsten penetrators. The radar's sensitivity has also been improved.



The newest version of the Mk-15 Phalanx family, the Block 1B. The Block 1B has a much higher rate of fire than earlier Phalanxs, has longer barrels for longer range and decreased dispersion, a bigger on mount magazine and an FLIR/TV tracking unit to the side of the radome. The TV unit enables the Block 1B to engage surface targets from the operators console inside the ship's operations room. It can also aid in round accuracy during ASM engagements. (Raytheon)

Block 1A

This mounting, which entered service in 1996, has a 32-bit microprocessor and Ada-language software to improve accuracy as well as having longer barrels for improved range and accuracy.

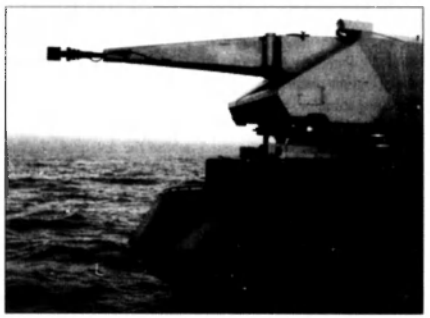
Block 1B

This is an upgraded Block 1A and adds a surface engagement mode capability to the anti-missile role through the attachment of an on-mount optical director. A High Definition Thermal Imager and video tracker is mounted on the left of the radome and provides the engagement controller with a manual acquisition capability from the operations room. Improvements to the software ensure the mounting will automatically break off a surface engagement if an air threat appears within range. Tracking accuracy has also been improved.

To reduce round dispersion the gun barrels have been lengthened by 482mm and extended muzzle restraints added while the elevating mass has been modified.

Millennium GDM-008

The GDM 008 is a Oerlikon-Contraves 35mm revolver cannon previously known as the Millennium MDG-35. It is intended as a CIWS using AHEAD (Advanced Hit Efficiency And Destruction) ammunition.



The Oerlikon-Contraves Millennium MDG-35 35mm revolver cannon. This CIWS is being marketed as an alternative to other systems such as Phalanx and Goalkeeper. Its performance statistics against ASMs are impressive. (Oerlikon-Contraves)

Oerlikon-Contraves and Lockheed Martin are currently in the process of navalising the mounting to market it as a competitor to the Mk-15 Phalanx.

The full Millennium system consists of a weapon direction system linked to the ship's combat management system through a local area network. The manufacturer claims that with a 25-round burst from the 35mm gun that a kill range against a manned aircraft at 3.5km and against a sea-skimming ASM at 1.5km can be achieved.

A low radar cross-section cupola covers the mount with an optional electro-optical director on the left of the elevating mass containing television, FLIR camera and an eye-safe laser.

The weapon can use a variety of ammunition. Its muzzle velocity is 1,050 m/s (AHEAD), with the round having 152 3.3 gram spin-stabilised sub-projectiles. The manufacturers claim that between 7 and 25 rounds will ensure the destruction of an 800m/s target at 1.65km, or 2.1km with a 36-round burst.

Sea Zenith

Sea Zenith is a four-barrelled 25mm gun system made by Contraves/Oerlikon and is named for its ability to bear on targets at the zenith by virtue of a slewing two-axis mounting which is inclined at 35° to the horizontal.

The four-barrelled 25mm Sea Zenith CIWS is named for its ability to bear on targets at the zenith by virtue of a slewing two-axis mounting which is inclined at 35° to the horizontal. The four 25mm guns have a combined rate of fire of 3,400rds/min. (Oerlikon-Contraves)

The Sea Zenith turret is 2.57m high, 2.57m wide and 3.44m deep.

The four 25mm guns have a combined rate of fire of 3,400rds/min, each gun being independently fed from ammunition drums mounted below decks or by the side of the gun. The ready-to-use supply of 1,660 rounds is sufficient for 18 normal engagements of ASM targets. It uses special ammunition with a forged tungsten core designed to ensure that a single hit will be sufficient to destroy a missile target by detonating its warhead.

Guidance for a Sea Zenith mount is provided by a separate yet exclusive fire control radar linked to a Sea Zenith fire control system which usually controls three mounts.

Some 24 Sea Zenith systems have been sold to Turkey and used aboard the 'Yavuz' (MEKO 200) and 'Barbaros' (Modifield MEKO 200) class frigates.

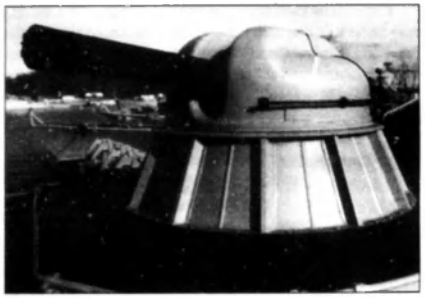
AK-630

Having developed many of the early ASMs the Soviet Navy was conscious of their lethality. During the late 1950s and early 1960s Soviet ASMD was based upon a combination of guns and electronic counter measures equipment but it was soon recognised that a more active defence was required.

Like the West, the Soviet Navy decided the most efficient means of countering ASMs that had leaked through the air defence screen was a radar-controlled gun with a high rate of fire. Development was authorised in July 1963 for a Gatling-gun system known as the A-213. However, testing did not begin until 1971 and it was not until 1976 that it was formally accepted into service, with its separate radar illuminator and fire control system, as the AK-630.

The 30mm AK-630 CIWS consists of a multi-barrel, high volume-of-fire Gatling gun, a separate fire-control radar and a below-deck control station with remote optical and/or electro-optical sensor.

The mount uses a water-cooled, six-barrelled AO-18, a Gatling gun weapon with fixed breechblock and revolving



The Russian AK-630 30mm six-barrel gatling gun CIWS. The AK-630 has been superseded by the Kortik/Kashtan but is still an effective and widely used CIWS

barrels. The magazine contains 2,000 rounds of HE-I and HE-T ammunition. The AO-18 weighs 205kg and has a cyclic rate of fire of 4,000 to 5,000 rds/min and a muzzle velocity of 900m/s. The gun fires bursts of up to 400 rounds at a time during which both the barrel and the breechblock are cooled.

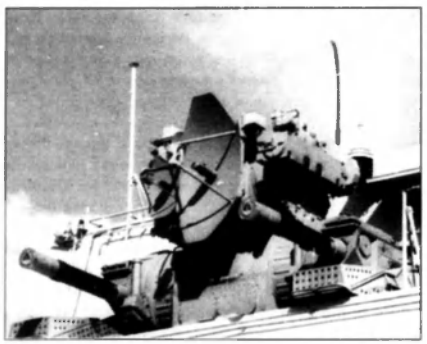
Unlike Phalanx the AK-630 features a separate radar director, the MR-123 Vympal (NATO code-name 'Bass Tilt') which is an H-band (6 to 8 GHz) system with its director mounted on a pedestal and its antenna with a drum-shaped radome else where on the ship.

Some 1,150 AK-630 gun mountings have been ordered or produced and the system remains in production.

Kashtan

The land based self-propelled 2S6M Tunguska self propelled anti-aircraft system entered service with the Soviet Army in 1986 as a replacement to the successful ZSU-23-4 self-propelled anti-aircraft gun. The 2S6M consists of two radar-directed 30mm guns supplemented by a new short-range air defence missile system, the 9M311, which has been given the NATO designation SA-19 'Grison'.

The Soviet Navy was quick to see the potential of the 2S6M Tunguska system as a CIWS to replace the AK-630.



The Kortik CIWS. It has two six-barrel gatling guns and can also be fitted with eight SA-N-11 Grison ASMD missiles. This image depicts a Kortik mount with two guns but no missile launchers, which are normally mounted above the guns

However, there would need to radical changes to navalise the system. While the SA-19 'Grison' was retained, the need for higher firepower against in-coming missiles dictated the replacement of the original single barrelled 30mm guns from the Tunguska with the AO-18 Gatling gun used in the AK-630, while the more taxing sea environment dictated new sensors and weapon control electronics. The new system was known as the 3M87 Kortik and received the NATO designation CADS-N-1 (Close Air Defence System-Naval-1) with the missile system, now a naval weapon, designated as the SA-N-11 'Grison'.

Production of the Kortik ceased in 1994 but it is still marketed today as the Kashtan. The difference between to the two mounts lies in the guns. The Kortik uses the AO-18 Gatling gun while Kashtan uses the two 30mm single barrel guns used by the 2S6M Tunguska.

The system is secured on a deck mounting on which it can turn 360° in azimuth. It is 2.25m high and has a swept radius of 2.76m. The total weight of the mounting is 13.5 tonnes

The Kortik/Kashtan is designed for point defence against ASMs and guided bombs to distances up to 4.5 n miles (8 km). It can be used by ships as small as 400 tonnes. The system is designed to engage targets with the SA-N-11 at distances from 0.75nm (1.5km) onwards (out to 8kms) and can use it guns on targets below 1500m down to 500m.

Above each AO-18 gun is a mounting for four launch containers for the SA-N-11 'Grison' missiles. The SA-N-11 'Grison' missile has 9kg warhead consisting of a 9mm rod that is 600mm long which splits into 2 to 3 gram pieces when detonated by the proximity fuze which, in turn, is activated when the missile is within 5m of the target. The sensor fit differs from 2S6M with the army radar replaced by the 3R87 (NATO designation 'Hot Flash') which features two paraboloid antennas. The search radar, to detect and track sea-skimming missiles, is mounted in the centre of the mount while the to the right the missile guidance radar. The transmitter and receiver electronics are mounted behind the antennas. To the left of the central radar antenna are two electro-optic sensors which consist of an IR tracker and a remotely operated TV camera.

Some 30 of these systems were produced for the Russian Navy but production has ceased. Kashtan continues to be marketed for export and at least half-a-dozen have been sold to India.

Goalkeeper

Like the USN the Royal Netherlands Navy (RNLN) drew up a requirement for a very short-range air defence system for its ships just after the EILAT incident.

From 1976 the Dutch firm Signaal began to develop the SGE-30 which combined a Dutch target acquisition/tracking system, a GAU-8/A multi-barrel gun and an EX-83 mounting. A prototype was completed in 1981. In 1983 the system, named Goalkeeper, was ordered by the RNLN. The following year it was also ordered by the Royal Navy.

Goalkeeper is an autonomous CIWS in which the entire engagement sequence from search to destruction is carried out automatically. It consists of a Sea Vulcan 30mm (GAU-8/A) gun, an I-band search radar, an I/K-band tracking radar and a TV camera.

The Dutch 30mm Goalkeeper CIWS. While being one of the best Western CIWS the Goalkeeper is a heavy mount that is far more intrusive into a ship's deck and design than most other CIWS.

The Goalkeeper's ready to use magazine has capacity for 1,190 rounds carried in a linkless system using a feed and storage drum. The ammunition capacity is claimed to be sufficient for several target engagements before reloading is necessary.

The turret is 3.41m high and 5.26m wide with deck penetration of 2.8m. The gun mounting is 6.8 t (unloaded) while the remainder of the below-deck equipment weighs 3.75 t.

This system has been tested against missile targets flying as low as 5m. Digital fire control processing, including curved path prediction, is used to predict the point of impact while automatic calibration and closed-loop correction are used to compensate for errors, including inaccurate ballistic data. There is an automatic kill assessment subsystem for use in case of multiple attacks to optimise the system's effectiveness.

Meroka

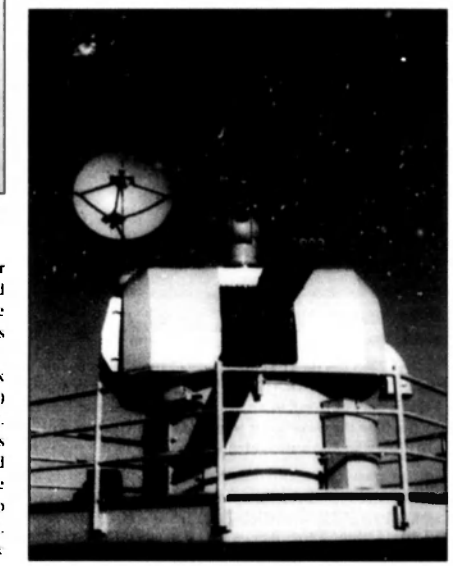
The Spanish Navy began to examine the options for a CIWS during the early 1970s and by 1975 began to consider a system based upon a 20mm gun being developed for the Army. By the end of 1975, Bazan had received a contract for the mount and system integration and a prototype appeared in 1977.

The Meroka consists of 12 barrels arranged in two connected rows and with a common breechblock. The 12 barrels form a single unit which is trained and elevated as with a conventional weapon and whose mechanical rigidity is aided by four steel bands. The outer bands are adjustable to allow the barrels to be either coned or spread for greater effect. Ammunition is provided by two belt feeds which are supplied from a hydraulically powered rotating magazine with a capacity of 720 rounds.

A pulse Doppler tracking radar is fitted on top of the weapon mount which is supplemented by a low-light TV camera bore-sighted to the gun axis and may be used if the tracker radar is out of action.

When an ASM target is detected by the ship's air search radar the data is passed to the Meroka fire control computer which begins tracking and designating a Meroka gun for the engagement.

Within two seconds of designation the Meroka is facing the target. The Meroka's tracking radar acquires the target at a range of some 2.5nm (5km). The electro-optical sensor is used to confirm target acquisition as well as confirming its identity while ballistic and interception prediction data are processed by the computer. Within 2.5 seconds the weapon is ready to engage the target at distances of between 500 and 1,500m.



The unmistakable 12 20mm barrels of the Spanish Meroka CIWS

Conclusion

As can be seen, gun CIWS's are developing to a point that require ASM manufacturers to either redesign missiles to avoid the accurate high rate of fire of the modern CIWS or possibly withstand its effects. It was thought for some time that 20mm CIWSs would not be powerful enough to destroy some of the Soviet ASMs due to hardening and their speed. Indeed, it is a considered belief that 20mm CIWSs, even if they do destroy an incoming ASM, may not do so at a range that precludes debris from the ASM damaging and potentially mission-killing the ship, particularly as at sea repair ships are now very rare in modern navies. Fortunately this belief has not been tested in combat but systems such as Phalanx and Meroka have addressed these concerns by increasing the accuracy, rate of fire and range at which ASM engagement can take place.

In Part two of Modern ASMD, Dr Thornhill will examine missiles that are currently used for ASMD.

(*)This article first appeared in Asia-Pacific Defence Reporter(A-PDR) magazine a year ago but has been amended by the author and reproduced with the permission of the Editor of A-PDR

The 1942 Channel Dash

The view from the bridge of the cruiser PRINZ EUGEN of the famous 1942 transit of the English Channel in broad daylight by three of the German Navy's capital ships, SCHARNHORST, GNEISENAU and PRINZ EUGEN and their escorts

At 2245 hrs on 11 February 1942 the Kriegsmarine (German Navy) began Operation Cerberus. The German battlecruisers SCHARNHORST and GNEISENAU, accompanied by the heavy cruiser PRINZ EUGEN, sailed from the French port of Brest, in an attempt to traverse the English Channel and reach the relative safety of German ports. By the time the three ships were in German waters on 12 February, the infamous "Channel Dash" was history. The British, who had anticipated such a move in the weeks before, were left embarrassed by their inability to stop them.

After conducting successful operations in the Atlantic Ocean in early 1941, SCHARNHORST and GNEISENAU arrived at Brest in March. There they waited for other Kriegsmarine units to arrive from Germany. The intention was to form a powerful surface-raiding group that could attack UK bound convoys in conjunction with U-boats. For various reasons this plan was delayed. It was mid May before a raid on allied shipping could be mounted. PRINZ EUGEN with the battleship BISMARCK, sailed into the Atlantic from Gdynia to conduct Operation Rhine.

The Royal Air Force had been busy during this time. After locating SCHARNHORST and GNEISENAU at Brest on 28 March, a major air campaign was conducted to damage the ships. Anti-aircraft defences around Brest were heavily re-inforced by the Germans. On 6 April 1941, an RAF Beaufort torpedo-bomber from 22 Squadron, Coastal Command, piloted by Flying Officer Kenneth Campbell, managed to get into the inner harbour. Flying at extreme low level, through bad weather and heavy anti-aircraft fire, they succeeded in torpedoing GNEISENAU before being shot down. All four crew were killed. Their efforts put the battlecruiser into dry dock for repairs for several months, and Campbell was awarded a posthumous Victoria Cross.

The German battleship GNEISENAU on sea trials

In a four-month period over 1800 aircraft conducted strikes against the battlecruisers, and actually succeeded in immobilising them, a fact not known to the British. PRINZ EUGEN, having avoided enemy contact after the destruction of BISMARCK, arrived at Brest on 1 June. A major French naval base, Brest offered excellent facilities for Kriegsmarine ships. But, because of its proximity to the British Isles, the port was exposed to constant surveillance and air attacks.

To plan for a possible attempt by the ships to return to German waters, Operation Fuller was drawn up on 29 April 1941 by the British. Until TIRPITZ sailed for the Norwegian port of Trondheim in January 1942, the major threat remained that of a rendezvous of the battleship with SCHARNHORST, GNEISENAU and PRINZ EUGEN. The threat posed by this group attacking Atlantic convoy routes tied up many allied resources.

By the end of 1941, the Commander in Chief of the German Armed Forces, Adolf Hitler, was growing concerned of a possible British invasion of Norway, and ordered SCHARNHORST, GNEISENAU and PRINZ EUGEN back to Germany. The head of the Kriegsmarine, Grand Admiral Erich Raeder, was opposed to such a move, and still hoped to send TIRPITZ to join the ships at Brest.

After the failure of Operation Rhine, Hitler was adamant; either the ships returned to Germany or they would be decommissioned, with their crews and guns moved to defend Norway. Vice-Admiral Otto Ciliax, the Commanding Admiral of Battleships for the Kriegsmarine, put forward a plan called Operation Cerberus to Hitler in Berlin on 12 January 1942. It proposed to return the ships to Germany via the English Channel. VADM Ciliax insisted that there should be a minimum of naval operations before the start of the operation, so as not to lose the element of surprise. The plan was to leave Brest after dark, again so as to maintain surprise for as long as possible, traversing the narrowest part of the English Channel, the Dover Straits in daylight.

The operation was approved by Hitler, who ignored the warnings of his admirals that it would end with the ships sunk in the Channel. Hitler compared the risk of running the British blockade to an operation for cancer: the operation might cost the patient's life, but without it he would certainly die.

Planning for Cerberus involved assistance from the Luftwaffe. General Adolf Galland made plans for at least 16 fighters to provide air cover at any one time while the ships were in the English Channel, while General Martini, in charge of the Luftwaffe radar effort, planned to jam British radar stations during the operation. On hearing these plans Hitler remarked that the air threat was exaggerated, and that British forces would not be able to react fast enough to stop the ships from making it to German waters. The Kriegsmarine assigned six destroyers to act as escorts for the heavier ships, as well as co-ordinating escort duties by German schnellbooten (E-Boats) along the Channel. SCHARNHORST, GNEISENAU and PRINZ EUGEN had extra anti-aircraft guns mounted, the latter alone had 64 20mm guns added. Air search radars were mounted on each of the major ships and they were assigned a Luftwaffe officer to liaise with the air cover.

Bomber Command were constantly harassing the ships and by February 1942 had flown thousands of sorties against Brest, dropping some 3,500 tons of bombs, losing some 127 aircraft in the process. Meanwhile RAF reconnaissance noted the arrival at Brest in late January of German escort ships, and Royal Navy and RAF commanders were duly warned on 3 February that a breakout might be planned.

In command of defences in the English Channel was Vice-Admiral Sir Bertram Ramsay. His forces to defend the Straits of Dover were a few motor torpedo-boats and gunboats. Ramsay also managed to obtain a further reinforcement of six Swordfish biplane torpedo bombers from 825 Naval Air Squadron. These were moved from Lee-on-Solent to RAF Manston in Kent, to help concentrate attacks in the chokepoint of the Dover Straits. Despite their night-bombing commitments, 100 Bomber Command aircraft were placed on standby each day as a reaction force.

HMS MANXMAN and WELSHMAN, together with a number of RAF aircraft, conducted intensive mine laying operations along the possible route in the Channel and beyond. As the threat of a breakout increased, the Admiralty arranged for six elderly destroyers from the Home Fleet to be stationed at Harwich to act as 'short notice' reinforcements. These forces were all that could be released to VADM Ramsay. The Home Fleet was stretched in the face of convoy commitments and the possible threat of the TIRPITZ operating in Norwegian waters. In addition, a large troop convoy was about to sail for the Middle East which could be threatened by SCHARNHORST, GNEISENAU and PRINZ EUGEN in the Atlantic.

With this knowledge, Ramsay knew that the Home Fleet could not assist if the ships in Brest sailed towards the Straits of Dover. The admiral and his staff believed that the Germans would use the cover of darkness to approach the Straits and pass through at daybreak. The plan to deal with this was to conduct a combined attack with torpedo-boats and Swordfish as the Germans passed Dover, with the six destroyers from Harwich joining the action shortly after. At the same time, level-bombing attacks were to be made by Bomber Command with strikes by Coastal Command torpedo-bombers. Ramsay

The German battleship SCHARNHORST

was concerned that if the ships took the best route through the Channel, British radar stations may not detect them until they were not much more than an hour away from the Dover Straits. Reconnaissance flights were stepped up as decoded message traffic was confirming that a breakout was imminent.

The Kriegsmarine ordered Operation Cerberus to begin after a favourable tide and weather report on 7 February. With poor visibility in the channel, the best night to depart was thought to be 11 February. Jamming British coastal radar by the Luftwaffe would not begin until 0900hrs the next day so as to not arouse British forces. The major ships, with six destroyers (Z4, Z5, Z7, Z14, Z25 and Z29) prepared to get underway on the night of 11 February. The entire operation was nearly halted due to a routine Bomber Command raid on the harbour by sixteen Wellington bombers at 1930hrs. At the beginning of the raid VADM Ciliax, embarked onboard SCHARNHORST, cancelled the order to get underway and prepared to conduct the operation on another night. However, after the raid (at 2100hrs), Ciliax countermanded his order and the ships set sail at once, clearing the harbour over 90 minutes behind schedule, at 2245hrs. At midnight he ordered his task force to proceed up the Channel, increasing speed to 27 knots.

For the British, the key flaw in their plans was the assumption that the German ships would time their run through the Dover Straits for the hours of darkness for maximum safety. Thus, when a reconnaissance flight on the late afternoon of 11 February showed the ships still in port, with no obvious sign of imminent departure, it was assumed that it was again too late for them to set out and still reach the Straits in darkness. Three RAF Hudson aircraft were sent out to conduct routine radar patrols in the Brest area that night. However, bad luck and the fragility of the still very new radar technology meant that the two aircraft most likely to have detected the German ships slipping out of Brest that night, suffered radar malfunctions. Similarly, good German luck spared them being spotted by the submarine HMS SEALION, patrolling the area.

During the hours of darkness the German ships made up lost time in smooth seas and by dawn the task force was off Cherbourg. It was there that the Luftwaffe fighter escort rendezvoused with the ships. Also joining the group were two squadrons of E-boats and coastal craft. Ultimately VADM Ciliax was in command of 30 ships heading for the Dover Strait under radio silence at 27 knots. By the time reports reached the British, the German force had steamed 300 miles undetected.

While the task force headed east at sunrise, a pair of Spitfires from RAF Hawkinge, patrolling the French coast noted unusual activity by light naval forces. By this time weather was poor, and deteriorating, with snow on the ground,

very heavy and low cloud offering at best poor visibility. From 0800hrs reports arrived about increased Luftwaffe activity over the Channel but they were dismissed as standard operations by the RAF. At 0920, the Germans began efforts to jam the British radars along the South Coast. Given this unusual behaviour, a second pair of Spitfires was sent to investigate the coast between Boulogne and Fecamp at 1020. By 1045 the radar station at Hastings had reported to VADM Ramsay that a group of ships was located 27 miles away at Cape Griz Nez and heading east. Although the radar station could not identify individual units, it was clear from the signal that there were large ships in the group.

With this information Ramsay placed both the RAF and six Swordfish biplane torpedo bombers of 825 Naval Air Squadron at RAF Manston, on alert. On returning from Fecamp, the second pair of Spitfires reported spotting a 'convoy' of up to 30 vessels, but there was no mention of SCHARNHORST, GNEISENAU or PRINZ EUGEN in the report that reached Ramsay at 1105hrs. Strict radio silence meant that it was only after the Spitfires had landed that they could report that one of the convoy was a possible capital ship.

The German cruiser PRINZ EUGEN. PRINZ EUGEN survived the war relatively unscathed despite numerous encounters with the enemy. Before Operation Cerberus she had accompanied the doomed battleship BISMARCK during her first and only sortie into the Atlantic. She also survived the channel dash and was only sunk after the war by the U.S during nuclear weapons trials in the Pacific.

At the same time, two senior RAF officers, Group Captain Beamish, commanding the RAF station at Kenley, with Wing Commander Boyd had taken off in their Spitfires on a combat air patrol over the channel in the hope of 'picking up a stray Hun'. While in pursuit of a couple of German fighters they suddenly found themselves over the unmistakable shapes of the German battlecruisers, at 1042hrs. Running into heavy anti-aircraft fire from the task force and realising what they had seen, Beamish and Boyd broke off and returned to base, being chased part of the way by German fighters. The two pilots had to wait until after they had landed, at 1109, to report their amazing encounter. VADM Ramsay was notified shortly after, and Operation Fuller finally began.

By 1120hrs the German task force was running at reduced speed as they proceeded through a minefield, but by 1140hrs they were clear and were working back up to 27 knots.

At 1130, Lieutenant Commander Eugene Esmonde, commanding the six Swordfish of the Fleet Air Arm at RAF Manston, received an order to mount an attack as soon as possible. It was recognised that these slow and vulnerable aircraft would need significant fighter escort to survive, especially as Esmonde's pilots were inexperienced. Three fighter squadrons from RAF Biggin Hill and two from R.A.F Hornchurch were ordered to accompany the antiquated biplanes. The Biggin Hill aircraft were to defend against the now very large Luftwaffe fighter escort covering the ships. Those from Hornchurch were to accompany the torpedo bombers in a low level attack, drawing anti-aircraft fire and strafing the ships. However, the Hornchurch fighter controller telephoned Esmonde to warn him that his squadrons simply

A Swordfish biplane torpedo bomber like those of 825 Naval Air Squadron based out of RAF Manston which took off, with only a fifth of the fighter cover that was originally planned, to attack the German fleet transiting the English Channel. None of the six would return

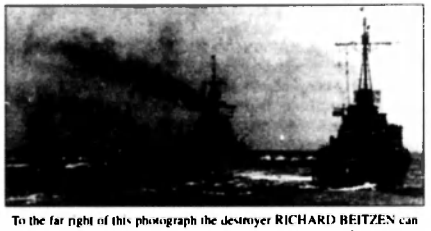
could not reach the rendezvous by the allotted time. The timing was also exceptionally tight for the nearer Biggin Hill units. But Esmonde feared that even a short delay might take the German ships out of reach.

As soon as the first ten Spitfires from 72 Squadron appeared overhead at Manston at 1228, he set off with his Swordfish, with only one-fifth of his planned escort. The RAF Station Commander at Manston said of Esmonde: "He knew what he was going into. But it was his duty. His face was tense and white. It was the face of a man already dead. It shocked me as nothing has ever done since."

At 1218hrs the Dover gun batteries opened fire on the task force, but failed to score a hit. Shortly after, eight Motor Torpedo Boats from Dover and Ramsgate attempted to attack the task force, but the heavy screen of E-boats surrounding the battlecruisers forced them to fire their torpedoes at extreme range, all missed.

German fighter attacks against the Swordfish began only ten miles out from the English coast. The Spitfires engaged, but found it impossible to keep track of their opponents and the slow moving, low flying Swordfish. The other two Biggin Hill squadrons arrived to engage German fighters in the general area. One Spitfire was lost and two Messerschmitts were thought to have been destroyed.

By 1245hrs the six Swordfish had pressed on alone, under heavy fighter attack and then, as the battlecruisers came into sight, intense anti-aircraft fire. The targets were in line-ahead formation, with PRINZ EUGEN leading SCHARNHORST and GNEISENAU with destroyers and E-Boats deployed on each flank. Esmonde led his squadron straight towards the enemy but the odds were overwhelming. The few escorting Spitfires could not hold off the Germans. With the lower port wing of Esmonde's biplane shot away, he somehow managed to keep flying until he was eventually shot down and killed

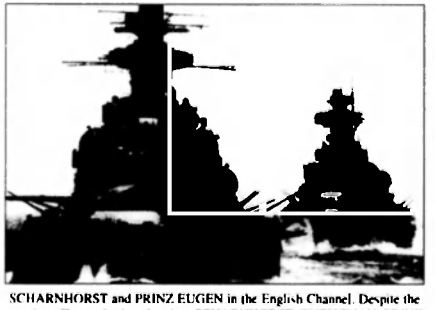


To the far right of this photograph the destroyer RICHARD BEITZEN can be seen. In the wake of the destroyer the SCHARNHORST followed by the GNEISENAU. The smaller vessels in the photograph were there to help protect the larger units.

with his two crewmen, just before he got in torpedo range. The two Swordfish with him managed to drop their torpedoes before being shot down; five of their six crew survived. The second section of three Swordfish was also shot down, with the loss of all nine men aboard. Their efforts were in vain, with no torpedoes hitting their targets. Esmonde was awarded a posthumous Victoria Cross, and the other seventeen men were also decorated.

As the German ships passed Ramsgate the weather in the Channel worsened, the only other available torpedo-bombers to conduct an air strike were the Beauforts of 217 squadron, Coastal Command. Part of the squadron was in Cornwall, but seven had been rushed to Thorney Island, near Portsmouth. Over the course of the afternoon five Beauforts attacked the task force without success. One was shot down by fighters. Other Beauforts and Hudsons of Coastal Command attempted attacks late in the afternoon on the task force, with the loss of four aircraft and no damage to the ships.

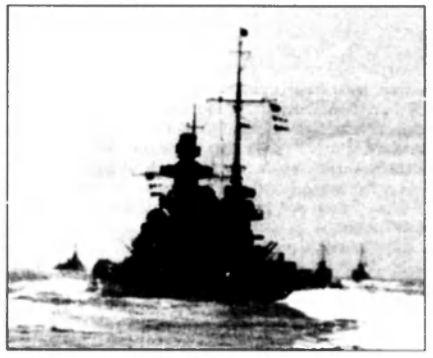
SCHARNHORST was damaged by a sea mine at 1431hrs during an attack by 217 Squadron and had come to a halt. VADM Ciliax moved his flag to the destroyer Z.29 as he believed that SCHARNHORST would have to be towed to a Dutch port. By the time the Admiral's staff was onboard the task force had sailed over the horizon and Z.29 raced to catch up. Shortly after, news came through that the damage to SCHARNHORST was slight, and the battlecruiser was again underway. By 1700hrs Z.29 was developing engine problems. An AA shell had exploded prematurely and fractured a pipe. Repairs had to be carried out, but the time delay was too much for Ciliax. Once again, the Admiral and his staff transferred, this time to the destroyer Z7.



SCHARNHORST and PRINZ EUGEN in the English Channel. Despite the massive effort and prior planning, SCHARNHORST, GNEISENAU, PRINZ EUGEN and their escort flotilla of destroyers, minesweepers and E-Boats slipped away into the safety of the night. The failure to sink the three ships was reported in the British press as a humiliating failure.

Meanwhile, the six elderly Royal Navy destroyers had sailed from Harwich and were proceeding south along the East Coast, coming under several air attacks. A squadron of RAF Whirlwind fighters was sent out in an attempt to ward off the Luftwaffe, but was bounced and lost four aircraft. HMS WALPOLE developed engine trouble and had to retire. The other five made radar contact at 1517, and ran in under heavy fire. They were repeatedly straddled, and HMS WORCESTER was set on fire. The destroyers fired torpedoes, but once again the range proved too great for accuracy. However, all the destroyers survived and retired to Harwich.

Bomber Command joined the fray at the same time, launching no less than 242 aircraft in three waves. Visibility was by now appalling, down to 1000-2000 yards in heavy



SCHARNHORST during Operation Cerberus. The battleship was damaged by a sea mine at 1431hrs during an attack by 217 Squadron Beaufort bombers and had come to a halt. The German Admiral in charge of the operation, VADM Ciliax, then had to move his flag to the destroyer Z.29 as he believed that SCHARNHORST would have to be towed to a Dutch port.

rain, and the very low cloud base meant that bombs could not be dropped from sufficient altitude to have a chance of penetrating armour. Thirty-nine bombers were able to attack the German ships or their escorts, but 188 could not find them, and 15 were shot down. Fighter Command also sent up a total of 398 fighters: 102 strafed German patrol boats in the area, and claimed 16 enemy aircraft shot down, for the loss of 17 RAF fighters.

Despite these massive efforts, SCHARNHORST, GNEISENAU and PRINZ EUGEN slipped away into the safety of the night. While the massed airpower failed to damage the three cruisers, mines laid in the previous week (with intelligence gleaned by code breakers) caused damage. At 1955hrs GNEISENAU triggered a magnetic mine off the coast of Holland causing minor damage, then at 2134hrs SCHARNHORST hit a second mine. The damage was moderate, and the battlecruiser was stopped for more than an hour before once more getting underway. She sailed at a reduced speed towards Wilhelmshaven, with part of the ship flooded with 1000 tons of seawater. By midnight, the ships of Operation Cerberus were either safely in a German port or in German waters. Ciliax's daring plan had succeeded.

For the British, the failure to sink the three cruisers was regarded as a humiliating failure. *The Times* leader on 14 February complained: "Vice-Admiral Ciliax has succeeded where the Duke of Medina Sidonia failed... Nothing more mortifying to the pride of sea power has happened in Home Waters since the 17th century."

The British failed to consider that the Kriegsmarine would sail their capital ships in the English Channel during daylight, and many believed that they would not sail in such poor weather conditions. Similar thoughts would be in the German High Command's minds when the Allies landed in Normandy. But perhaps the fairest judgement came from a senior German officer, General-Admiral Saalwachter: "Our achievement should not disguise the fact that the dangers were still extremely high. We have without question been blessed by considerable good fortune, even when one considers the full significance of our initiative, use of surprise, good planning, strong fighter cover and strict security. I would also consider that the high risks of such an operation do not alter with hindsight."

For Hitler, this was another vindication. Once again he had shown that he knew better than his High Command. In backing Operation Cerberus he argued that the British would never be able to react fast enough and he was absolutely correct: the ships got through.

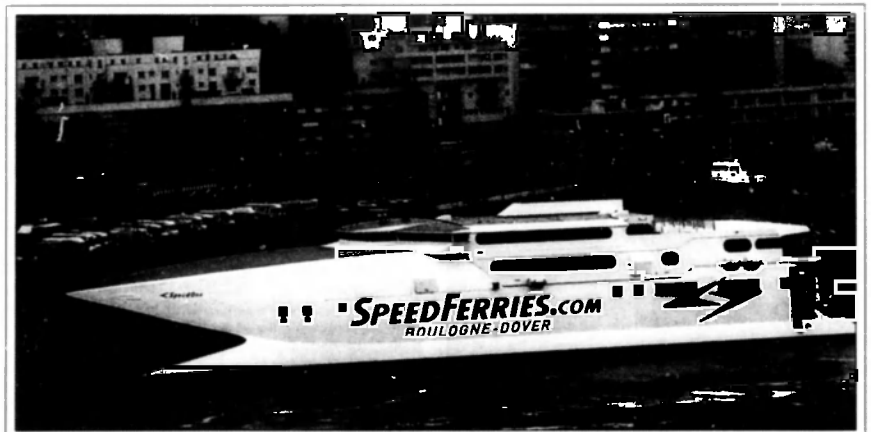
Operation Cerberus was a tactical victory for the Kriegsmarine. However, the capital ships were now well away from Allied convoys and a Commando raid a few weeks later on Saint Nazaire, which destroyed the dry-dock there, helped ensure that large German ships never again operated from the Western French port. Ultimately the U-Boats became the frontline units to go after the convoys.

The operation was considered a strategic victory for the Allies, as it freed up ships and aircraft for other duties. It was also the beginning of the end for the Kriegsmarine's heavy surface units. After the failure of Operation Rainbow, an attempt by the cruisers HIPPER and LUTZOW to intercept and destroy Arctic Convoy JW-51B in the Barents Sea on 31 December 1942, Hitler demanded that the heavy ships of the Kriegsmarine be paid off and scrapped. When Grand Admiral Raeder found out that he couldn't change Hitler's mind, he resigned as Commander in Chief of the German Navy. His replacement, Admiral Donitz, managed to convince Hitler to keep SCHARNHORST and TIRPITZ.

As to the fate of the three main players: SCHARNHORST met her end during the battle of North Cape on Boxing Day 1943 where she was sunk by the battleship HMS DUKE OF YORK. RAF bombers damaged GNEISENAU in March 1942 and attempts to repair her were ultimately abandoned. PRINZ EUGEN survived the war and became a war prize for the United States. She was sunk during atomic tests at Bikini Atoll in 1946.

Continued from page 23

A USN S-3 Viking on final. The USN's 103 S-3 Vikings are already starting to be withdrawn from USN service with two squadrons already consigned to the Arizona boneyard. All S-3s will be withdrawn by 2009. Ironically the S-3 is one of the most versatile aircraft in the USN's arsenal. It can perform its main role of ASW as well as anti-shipping missions with Harpoon missiles, land attack with conventional bombs, TV guided Mavericks and using the new SLAMER missile. It is also the USN's only shipborne air-to-air refueller until the F/A-18 E/F enters service in larger numbers. (USN)



INCAT Hull 045, SpeedOne, in the colours of her new owner SpeedFerries. SpeedOne fast catamaran service commenced on 19 May across the English Channel between Dover UK and Boulogne in France, offering a low cost best value ferry service to the beautiful city of Boulogne after a break of many years. The 86 metre high speed catamaran built by Incat in Australia crosses the Dover Strait in 50 minutes making five return trips each day in a year- round service for a new operating company SpeedFerries. SpeedOne takes the number of Incat built high speed catamarans operating on the English Channel to ten, with all the fast ferries operating out of the world's busiest port (Dover) being Incat vessels – impressive numbers in that ten of the eleven cross-channel fast craft were built by one Australian shipbuilder, Incat. Many readers of *THE NAVY* will know SpeedOne as the former HMAS JERVIS BAY (INCAT)

Flash Traffic

Decommissioning dates for Fremantles

The Chief of Navy, VADM Chris Ritchie, has approved the decommissioning schedule of Australia's Fremantle Class Patrol Boats.

The first boat to go will be HMAS WARRNAMBOOL, who will begin her Paying Off Availability on August 24 and the last, HMAS GLADSTONE, will remain in service until 2007.

In an All Ship – All Shore signal, VADM Ritchie said the release of dates had been made to allow an orderly transition to the new Armidale boats and to keep the remaining Fremantles operational during the change-over.

"The Fremantle Class Patrol Boats have served the nation in commendable fashion since 1979," CN said.

"Whilst this signals a sad farewell to the FCPB, it heralds a bright and exciting future for the Patrol Boat Group."

WARRNAMBOOL and WHYALLA, the second due to decommission, will be cannibalised of all items required to keep the remaining 13 boats in good operational order, but the future of the 13 is yet to be resolved.

Commander of the Fremantle Class Patrol Boats Force Element Group, CAPT Peter Marshall, said his flotilla had been at the forefront of enforcing government policy on illegal immigration, civil surveillance and fisheries protection.

"They have done an outstanding job," CAPT Marshall said.

"The Patrol Boat sailors are an exceptional bunch.

"They are highly professional and able in a pretty tough environment," he said.

"In the short time I have been with them, their professionalism, quality, dedication and capacity have impressed me greatly."

He also praised the supporting organisations, HMAS CAIRNS, HMAS COONAWARRA and FIMAS DARWIN and CAIRNS.

"They're very, very skilful, efficient and helpful," CAPT Marshall said

HMAS WARRNAMBOOL's final captain, LCDR John Navin, said it was with mixed feelings that he and his crew approached her decommissioning.

"I've been on board the 'Bool just for four months, but in that short time it's been obvious that the crew is very proud of their ship.

CAPT Marshall said the phasing in of the Armidale Class would herald an increase in availability to 3000 sea days for the patrol boat fleet, with a surge capacity of a further 600 days if required.

"Although there will be only 12 boats instead of 15, the FEG will have a total of 18 crews, enlarging our capabilities," he said.

"They will have a much better gun, two larger RHIBs will give an increase in boarding ability and their habitability will be far, far superior.

"Any sailor can tell you the Fremantles have the worst accommodation of any ships in the Fleet," he said. "In the Armidales, all the sailors will be accommodated in four-berth cabins ... and that will allow female sailors on board, too, instead of just female officers."

Decommissioning dates:

- WARRNAMBOOL August 24, 2004
- WHYALLA November 1, 2004
- CESSNOCK May 2, 2005
- DUBBO May 2, 2005
- LAUNCESTON August 29, 2005
- BUNBURY August 29, 2005
- GEELONG September 26, 2005
- WOLLONGONG October 3, 2005
- FREMANTLE January 2, 2006
- GERALDTON January 30, 2006
- BENDIGO April 24, 2006
- GAWLER May 22, 2006
- TOWNSVILLE September 4, 2006
- IPSWICH October 2, 2006
- GLADSTONE January 15, 2007

By LEUT Aaron Matzkows, NAVY NEWS

MANOORA gets five month overhaul

One of the RAN's "can do" ships, HMAS MANOORA has entered the Captain Cook Graving Dock in Sydney for a five-month-long refit.

It is the first major refit for the 8,450 tonne warship since Forgacs/Newcastle converted her from a "horned" Newport Class transport (formerly USS FAIRFAX COUNTY) to the versatile amphibious transport that she is today.

MANOORA and sister LPA KANIMBLA (formerly the USS SAGINAW) were bought from the US and commissioned into the RAN in 1994. ADI Ltd won the multi-million dollar contract to carry out the current refit.

On April 5, a fleet of DMS tugs guided the warship from Fleet Base East to the southern section of the graving dock. A caisson was lowered and water pumped from the dock leaving MANOORA high and dry on a set of pre-positioned concrete and timber pillows.

"It is a five-month-long refit," her CO, CMDR Martin Brooker said.

"It is the first major refit since she was modernised.

"She should emerge from the dock at the end of June with the work due to be completed in September.

"Sea trials are scheduled to commence in October," he said.

He said one of the major projects of the refit was the installation of a new electrical switchboard and associated cabling.

He also said the ship's company would be reduced allowing some members to take leave or do courses to enhance their careers.

Dockside offices would be used by the ship's company while ADI workers and their contractors carried out their tasks.

MANOORA will remain "in commission."

By Graham Davis, NAVY NEWS

RN 800 Squadron decommissions

A quarter of a century of Naval aviation has been consigned to the history books in style with the disbanding of the first of the RN's two FA-2 Sea Harrier squadrons.

In the skies above Devon and Cornwall, 800 Naval Air Squadron's Commanding Officer Cdr Paul Stone took up his jump jet for almost the last time.

Not any old Harrier, but one specially painted in 800's famous red livery, complete with squadron badge to commemorate the Squadron's decommissioning after 24 years of service by the Sea Harrier in its two guises, the FA-2 and FRS-1 – the latter last flew in 1995.

Cdr Stone said his Yeovilton-based squadron was disbanding on a high note.

"The last year of 800 as a Sea Harrier squadron has been amongst its busiest yet," he said.

"2003 saw the squadron detached to Malaysia, the USA and embarked upon INVINCIBLE and ARK ROYAL.

"During this time we've flown with French supersonic Mirage bombers against Spanish F-18s and alongside Malaysian MiG-29. Australian F/A-18 and Singaporean F-16s."

Of the squadron's jets, seven are going to other units, but two will be scrapped.

800 Naval Air Squadron's Commanding Officer Cdr Paul Stone in his specially painted 800 Squadron famous red livery, complete with squadron badge to commemorate the Squadron's decommissioning after 24 years of service by the Sea Harrier

But this is not the end of 800 NAS – motto Nun quam non paratus, or 'never unprepared' – as it will stand up again on April 1, 2006 at RAF Cottesmore as a Royal Navy GR-9 squadron, operating the upgraded bomber variant of the Harrier.

Neither is this the end of the FA-2 just yet. The Sea Harrier will continue to serve the Fleet Air Arm until 899 NAS, the training unit, and front-line sister squadron 801 NAS pay off in March 2005 and 2006 respectively.

The Sea Harrier is being retired as the Fleet Air Arm and RAF prepare for the introduction of the new Joint Strike Fighter, and the conversion to the common upgraded Harrier is a major step in the process.

From the early days of the Strategic Defence Review in 1998 it was recognised that closer links between the Fleet Air Arm and the RAF would pay dividends in the future – but that integration of the two Harrier types was not feasible.

Although they share a name, less than ten per cent of the airframe and avionics are common, and the Sea Harrier, which has a less powerful engine than the RAF version, could not be adapted to take the new Mk 107 jet which powers the uprated GR-9.

800 NAS – which with sister units 801 and 824 NAS is the oldest of Naval Air Squadrons – has served the Fleet Air Arm on and off since 1933, distinguishing itself in the Norwegian campaign, Malta convoys and attacks on BISMARCK and TIRPITZ.

Post-war it saw action over Korea, flying more than 350 combat sorties without losing a single man or aircraft, and in the Suez crisis, and later flew Buccaneers before being disbanded in 1972.

It was reformed within a decade to become the first FAA unit to operate the Sea Harrier, which it did with aplomb during the Falklands Conflict from HMS HERMES, destroying 13 Argentine aircraft.

In its lifetime the squadron has achieved some notable maritime aviation firsts, including being the first to fly jet aircraft (the Supermarine Attacker) and the first high-altitude interceptor squadron, as well as the first to be equipped with the Grumman Hellcat.

From the first days of the Hawker Nimrod and Hawker Osprey to the FA-2 Sea Harrier the squadron has flown 15 different aircraft types in operations around the world, from Scandinavia to Burma during the war, and just as widely in times of peace.

Trawler's big catch

A Danish trawler made a surprise catch last May when it found a German submarine in its net off the coast of northern Denmark.

The trawler *Marie Helene* was fishing in the Skagerrak waters between Norway and Denmark, about 20 nautical miles off the Danish port of Hirtshals, when it made its unusual catch.

The German submarine was participating in NATO manoeuvres when it got caught in the trawler's nets, forcing it to rise to the surface, much to the shock of the Danish fishermen on board.

"The crew of the trawler was never in danger, they were more scared than anything else," Danish sea rescue officials told news sources.

"But the trawler's nets were not able to withstand (the weight of) this extraordinary catch," a sea rescue duty officer said. While it took hours for rescue teams to remove the submarine from the trawler's nets, the Danes played the incident down.

"Except for a damaged trawler, it was rather undramatic," Alex Jensen, a Danish Navy spokesman said.

This is not the first time a Danish fishing boat has had a close shave with a submarine in the region. In March 1984, three fishermen were killed when their trawler was pulled to the bottom by a German submarine caught up in its nets.

RONALD REAGAN launches last Tomcat

An F-14 Tomcat from Carrier Air Wing (CVW) 8's Fighter Squadron (VF) 213 Black Lions, homeported out of Naval Air Station Oceana, Va., launched from USS RONALD REAGAN (CVN-76), May 10, in what was the final Tomcat to leave the deck of the ship.

With a transit date to its new homeport location in San Diego scheduled for late May, RONALD REAGAN will be supporting West Coast squadrons, which do not include the F-14 Tomcat.

"Just like RONALD REAGAN has a lot of innovations and is the first step to future carriers like CVN-21, our launching of the final Tomcat marks the transition the Navy is making to F/A-18 air wings and eventually the Joint Strike Fighter," said Capt. Drew Brugal, RONALD REAGAN's executive officer.

Brugal started flying Tomcats in 1984. Despite his personal history with the aircraft, he is not disappointed to see it being transitioned out of the Navy.

"I'm not sad," said Brugal. "Having gone from flying F-4s to the Tomcat and seeing the benefit of getting into new technology, I view the new transition as a positive stepping stone to the next level."

After the Tomcat launched off the deck, all hands were invited to the flight deck to watch it make one final flyby. With a tip of the wing, the F-14 shot by RONALD REAGAN on its way back to Oceana.

"Being part of a historic moment is an experience I'll never forget," said Airman Randall Pugh, a member of air department. "Very few people will have the honour of saying they saw the last Tomcat fly off the Navy's newest aircraft carrier, and I'll remember it the rest of my career."

Scorpene submarines attracting interest

The Armed Forces of Thailand are said to be interested in the Scorpene class submarine currently under construction in the Izar naval factory in Cartagena, Spain.

A delegation from the Thai Government recently visited the facilities Izar in Cartagena as well as the Submarine Base that the Spanish Navy has in this city.

A time has not been set for possible submarine acquisition by the Thai's but it has been known for sometime of their interest in submarines. The Scorpene class is currently on order for Malaysia.

Boeing delivers 7,000th Harpoon

Boeing officials delivered the 7,000th Harpoon missile to the Egyptian Navy at the Boeing facility in St. Charles, Mo., recently. During a handover ceremony, both Boeing and U.S. Navy representatives congratulated the allied Naval service and thanked them for their support and friendship for more than 30 years.

"Harpoon is used by 27 nations, including the U.S., and is Naval Systems Command's largest international program for the last two years," said Captain David Dunaway, PMA 201 Program Manager for the Navy. "The timeless design of the Harpoon is evident through its successful history and viable performance in the field over the past 30 years."

"Since 1978, the U.S. and Egyptian militaries have trained together on land, in the air and at sea," said John Lockard, Senior Vice President and General Manager of Boeing Naval Systems. "Boeing has been a part of that, having supplied the Egyptian military with products such as the Apache, Chinook, and Harpoon, as well as providing support for modernisation and upgrades programs over the years. So it's only fitting that today we come together to deliver the 7,000th Harpoon Missile to our customer and ally."

The Harpoon Block II missile, which was presented to the Egyptian Navy, incorporates key guidance technologies from two other Boeing weapons programs – the low-cost, inertial measuring unit from the Joint Direct Attack Munitions (JDAM); and the software, mission computer, integrated GPS/Inertial Navigation System, and GPS antenna and receiver from the Standoff Land Attack Missile Expanded-Response (SLAM-ER).

Australia is due to receive the Harpoon Block II in the next few years for the Anzac frigates.

SM-3 Block 1A for Japan

On 5 May 2004, the US Defense Security Cooperation Agency notified Congress of a possible Foreign Military Sale to Japan of SM-3 Block 1A Standard Missiles as well as associated equipment and services.

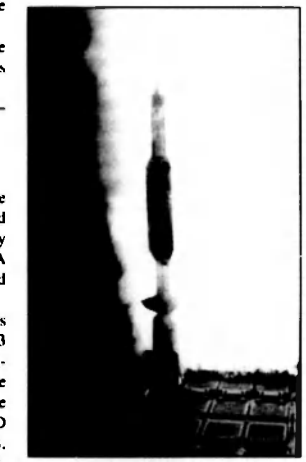
The Government of Japan has requested a possible sale of nine SM-3 Block 1A Standard missiles with MK-21 Mod 2 canisters, Ballistic Missile Defense (BMD) upgrades to one AEGIS Weapon System, AEGIS BMD Vertical Launch System ORDALTs, containers, spare and repair parts, supply support, U.S. Government and contractor technical assistance and other related elements of logistics support. The estimated cost is $725 million.

Japan is one of the major political and economic powers in East Asia and the Western Pacific and a key ally of the United States in ensuring the peace and stability of that region. It is vital to the U.S. national interest to assist Japan to develop and maintain a strong and ready self-defense capability, which will contribute to an acceptable military balance in the area. This proposed sale is consistent with these U.S. objectives and with the 1960 Treaty of Mutual Cooperation and Security.

Japan will use the Standard missiles to update older or less reliable missiles currently in the Japan Maritime Self Defense Force (JMSDF) fleet. The AEGIS Weapon System and Standard missiles will be used on JMSDF ships. The purchaser, who already has missiles in its inventory, will have no difficulty absorbing these additional missiles.

The proposed sale of this equipment and support will not affect the basic military balance in the region.

The principal contractors will be: Lockheed Martin Naval Electronics and Surveillance Systems of Moorestown, New Jersey; Raytheon Company of Andover, Massachusetts; and Raytheon Company in Tucson, Arizona. There are no known offset agreements proposed in connection with this potential sale.



An anti-ballistic missile SM-3 launches from the Mk-41 launcher of a US Navy cruiser. Japan is set to become the first foreign customer of the anti-ballistic missile capability found in the SM-3 missile.

Implementation of this proposed sale will not require the assignment of any additional U.S. Government or contractor representatives to Japan.

There will be no adverse impact on U.S. defense readiness as a result of this proposed sale.

Law requires this notice of a potential sale; it does not mean that the sale has been concluded.

Lockheed Martin demonstrates Aegis open architecture

Lockheed Martin successfully migrated two key elements of the Aegis Weapon System to an open architecture environment, a move that will significantly enhance the capabilities and service life of the U.S. Navy's premier surface combat system while also reducing its cost. The Aegis combat system is to be used by the RAN's new SEA 4000 air warfare destroyers when

they are introduced into RAN service in 2013.

"The Lockheed Martin Open Architecture team is making impressive progress," said Capt. Richard T. Rushton, the Navy's chief for the Network Systems & Integration directorate. "The team's innovative engineering approach and commitment to open architecture indicates we are on track for our upgrade timeline."

Open architecture systems exploit commercial computing technology, allowing the Navy to install software and other technology upgrades faster and more cost effectively throughout the life of a ship, aircraft or submarine.

The first step, to be completed next year, will upgrade the radar control architecture and computing environment for all SPY-1 radar systems, beginning with SPY-1B/D. In parallel, the Aegis weapon control and display system are also being architected to operate in an open computing environment.

USN's future warfare strategy

Northrop Grumman Corporation and the U.S. Navy have advanced, with a recent exercise, the service's warfighting goal of interconnecting sensors, manned and unmanned aircraft, ships and offensive weapon platforms in real time to locate and strike targets.

In a demonstration held on April 14 this year, engineers from the Naval Air Systems Command and Northrop Grumman's Integrated Systems sector used a Navy E-2C Hawkeye battle management aircraft to integrate and direct a precision strike mission using information provided over a network by a Navy RQ-8 Fire Scout unmanned aerial vehicle (UAV), a simulated aircraft carrier operations control centre, and an F/A-18 strike aircraft.

Northrop Grumman's Advanced Information Architecture (AIA), an Internet-like communications architecture of in-theatre, platform-based servers, provided the data storage and sharing capabilities that enabled this first-time communication among manned and unmanned Navy airborne systems.

"The Navy/Northrop Grumman team created a non-proprietary, open-architecture network for this demonstration using commercial-off-the-shelf equipment – and we did it without writing a single line of software code, "said Tim Farrell, Vice President and leader of Northrop Grumman's airborne early warning integrated product team. "The network, which included the company's AIA server and related software, was up and running in less than a week, a testament to the joint team's ability to provide innovative, cost-effective solutions for complex FORCEnet requirements."

FORCEnet is the network of systems that the US Navy envisions will integrate its Sea Power 21 operational concept. FORCEnet spans and integrates everything the Navy must do – from undersea to space operations, from procuring parts and systems to payroll and housing – to carry out its mission.

In the command and control exercise, the E-2C aircraft directed the Fire Scout vertical takeoff and landing tactical UAV to search for a suspected target within a specified area. The UAV captured and stored real-time video imagery of the target areas on board its AIA server. The E-2C then downloaded this digital imagery from Fire Scout and sent it over a wideband network to a software-simulated aircraft carrier operations centre in Newport News, Va., and ground stations in Bethpage, N.Y., and Arlington, Va.

Operators in both the carrier operations centre and the E-2C Hawkeye used specialised targeting software to determine precise target coordinates, then posted them to a Web site. The Hawkeye crew used the data from that Web site to direct an orbiting F/A-18 Hornet aircraft to simulate an attack on the target.

"This concept demonstration proves that an innovative team armed with available technology can create a digital kill chain capable of reducing strike timelines from hours to a few minutes," said Capt. Robert LaBelle, NAVAIR E-2/C-2 program manager. "The Navy will use this concept to develop proposed capabilities that could be further evaluated under its Sea Trial initiatives."

The team for this battle management command and control demonstration comprised elements of the Naval Air Systems Command's PMA-231 (E-2C), PMA-263 (Fire Scout), and PMA-265 (F/A-18) program offices, its VX-20 test squadron, and representatives from Northrop Grumman's Integrated Systems and Newport News sectors.

The Hawkeye and Hornet aircraft flew out of Naval Air Station Patuxent River, Md. The Fire Scout operated from Webster Field, Md. The Virginia Advanced Shipbuilding and Carrier Integration Center (VASCIC) simulated aircraft carrier is located in Newport News, Va. A joint effort of the Commonwealth of Virginia, the City of Newport News and Northrop Grumman's Newport News sector, VASCIC is a "proving ground" for advanced shipbuilding and operations technologies.

The ground stations in Bethpage and Arlington are part of the Northrop Grumman nationwide Cyber Warfare Integration Network (CWIN), a synthetic engineering environment that links four company sites linked to one another and customer sites around the country. CWIN was created to design systems and "systems-of-systems" and evaluate them within real-time, full-spectrum battlefield, homeland security and other scenarios.

The April 14 test demonstrated that CWIN can receive data from ships, planes and other platforms, sensors, weapons and battle management command and control centres anywhere in the world, or from internally generated, high-fidelity models, to create real-world environments.

The Northrop-Grumman proposed Advanced Information Architecture stores imagery and other critical battlefield information in a network of high-capacity servers located on in-theatre airborne intelligence, surveillance and reconnaissance, and battle management platforms. It allows 'bandwidth challenged' tactical users to download mission critical data on demand directly from platforms such as the U.S. Air Force's E-8C Joint Surveillance Target Attack Radar System (Joint STARS), the RQ-4 Global Hawk aerial reconnaissance system or the Navy's RQ-8 Fire Scout tactical UAV.

AIA provides a faster, simpler alternative to the expensive, bandwidth-intensive process used in recent foreign conflicts to download Global Hawk image data to ground stations based in the U.S., analyse it, then push it back into theatre on demand. To date, the company has validated the concept in scenarios involving exchanges between Global Hawk; Joint STARS and ground users; and exchanges between a Global Hawk surrogate; a Fire Scout surrogate and ground users.

V-22 completes icing trials

Osprey No. 24 returned to the US Naval Air Station Patuxent River on the afternoon of April 29 after spending six months conducting aircraft icing tests from the Canadian Forces Base Shearwater near Halifax, Nova Scotia. During the detachment, Osprey No. 24 logged 67 hours, 37 of which were in actual icing conditions.

The accumulation of ice on flight control surfaces has always been a potential hazard to aviators. The rapid buildup of ice on wings can dramatically change an aircraft's flight characteristics, in extreme cases rendering it unable to fly. Generally, pilots don't fly in ice. Because of the nature of the V-22's mission – rapidly getting combat troops and supplies where they are needed – Osprey crews may not always have the luxury of avoiding bad weather. As a result, the Osprey has a requirement for a robust and capable ice detection and anti-ice system.

"The prototype icing system worked better than expected," said Maj. Frank Conway, USMC, who, along with Chief Corporate Test Pilot Tom Macdonald, flew all of the icing test flights. "Other than tweaking the algorithms that control when the wing boots inflate to remove ice and at what temperature heat is sent out to the prop-rotors, there was very little redesigning of the system done while we were in Halifax." Maj. Conway noted that the only major configuration change engineers are investigating is where to move the icing detection probe to provide the timeliest feedback to the pilots.

"The detachment was extremely successful," said Don Byrne, who alternated Integrated Test Team Flight Test Director responsibilities with the ITT's Paul Gambacorta. "We cleared all temperature and liquid water content ranges, so now we're able to fly for extended periods of time in all weather conditions."

ARMIDALE on the way

Production has commenced for the RAN's Armidale Class patrol boats which will form the front line of defence for Australia's maritime boundaries. To be built in Western Australia over a 42 month period, the 12 vessel fleet will act as the principal maritime patrol and response element of Australia's National Civil Surveillance Program.

Project partners Austal Ships and Defence Maritime Services (DMS) held a ceremony recently attended by Senator David Johnston, Senator for Western Australia, representing the Minister for Defence, key personnel from the Department of Defence and Defence Materiel Organization and Patrol Boat Group Commander Captain Peter Marshall, to mark the start of production of the first ship in the class, HMAS ARMIDALE.

Australian cities and towns with close links to RAN history will lend their names to the fleet with HMAS ARMIDALE to be launched in January and delivered in April 2005. The second and third Armidale Class vessels will follow six months later.

Mr John Rothwell, Executive Chairman of Austal Ships which designed and will build the vessels, said much research and technology had been invested into the project. "The protection of Australian waters will benefit from the superior performance of the Royal Australian Navy's Armidale Class patrol boat fleet, which represents the largest defence contract ever awarded in Western Australia," he said.

The fleet, with a total contract value of approximately $550 million, will primarily carry out surveillance, interception, investigation, apprehension and the escort to port of vessels suspected of illegal fisheries, quarantine, customs or immigration offences.

Mr Ross Brewer, Chairman of DMS which was the successful tenderer and will manage project requirements and provide in-service support to the vessels throughout their operational lives, praised the features of the Armidale Class fleet. "The vessels will provide the RAN with greater speed, comfort and sea keeping and reduced through-life costs when compared with the Fremantle Class vessels they are replacing. The DMS-Austal Ships team is facilitating the schedule for the timely delivery of vessels and we look forward to seeing the entire fleet in operation," he said.

Based in the ports of Darwin and Cairns, the Armidale Class fleet will operate to the limits of Australia's exclusive economic zone. The vessels are designed for operation in the tropical sea and weather conditions of Australia's northern waters as well as the Southern Ocean, such as the South Tasman Rise Fishery which lies some 300 nautical miles south of Tasmania (48°S). The vessels will also be capable of deployment to Christmas and Cocos Islands and to other countries in the region for occasional exercises and cooperative operations.

BALLARAT delivered to RAN

The RAN has taken delivery of the eighth Anzac-class frigate, NUSHIP BALLARAT, during a ceremony in Williamstown, Melbourne, on April 30.

With the Ship's Company in attendance, Tenix Managing Director Paul Salteri handed over the vessel to Director General, Major Surface Ships, Commodore Keith Malpress and Commanding Officer of BALLARAT, Commander David Hunter.

Built by Tenix Defence Pty Ltd at the Williamtown shipyard, the ship features state-of-the-art weaponry and a range of capability enhancements unique to Australia. The 17-year fixed price contract is worth over $A7 billion and is the largest and arguably most successful defence project ever awarded in Australia.

It is providing long-term benefits for the economies on both sides of the Tasman involving about 1300 companies with 73 per cent local industry content and providing 8,000 local jobs.

The keel of BALLARAT was laid on 4 August 2000 and she was launched on 25 May 2002. The ship is scheduled to be commissioned into the RAN in mid 2004.

BALLARAT is the second RAN ship to bear the name after the city of Ballarat. It follows the first HMAS BALLARAT, which was launched in December 1940 as one of 60 Minesweeping Corvettes. It served with distinction during WWII and is known for rescuing Flying Officer J.G. Gorton RAAF, who later became Prime Minister of Australia.

The 10th and final Anzac class ship (PERTH) is scheduled to be delivered by mid 2006.

SPY-3 active

The U.S. Navy's first shipboard active phased array multifunction radar, AN/SPY-3, successfully achieved a significant performance milestone recently during testing at the US Navy's Land Based Test Site at Wallops Island, Va.

The Raytheon-designed radar performed precision track of a low altitude BQM-74 test drone during multiple inbound and outbound flights. The SPY-3 is being developed as part of the DD(X) program, headed by Northrop Grumman Ship Systems.

The SPY-3 is an active phased array X-band radar designed to meet all horizon search and fire control requirements for the 21st century fleet. The multifunction radar combines the functions provided by more than five separate radars currently aboard Navy combatant ships. SPY-3 supports new ship-design requirements for reduced radar cross-section, significantly reduced manning requirements, and total ownership cost reduction. The SPY-3 radar is being designed for the DD(X) class of surface combatants, the transformational aircraft carrier CVN-21, and the US Navy's next-generation amphibious warfare ships. Raytheon serves as the electronic and weapons systems integrator for DD(X) as a subcontractor to Northrop Grumman Ship Systems.

Development of the SPY-3 began in 1999 and was delivered to the Navy's test site in early 2003 for its two-year testing program. Work was performed at Raytheon's Integrated Air Defence Centre in Andover, Mass., its Surveillance and Sensors Centre in Sudbury, Mass., and its Integrated Defence Systems Headquarters in Tewksbury, Mass.

RN MK 8 receiving long-range rounds

British warships will be able to fire more powerful shells at targets on land at much longer ranges, following the entry into service of improved ammunition.

The new shell was specially designed for bombardment of targets in support of troops on shore and can range up to 27 kilometres – an improvement of some six kilometres or more than one quarter on the shell it succeeds in service.

HMS RICHMOND, a Type 23 frigate, will be the first warship to carry the new ammunition. A total of 26 ships equipped with the Mark 8 gun, and the new Type 45 Destroyers, due to enter service later this decade, and will use the new improved ammunition.

UK Defence Procurement Minister Lord Bach said:

"Extending the range of our warship's main guns with these new and more effective shells will greatly increase the Royal Navy's ability to engage land targets in support of our troops. Additionally, it will reduce exposure of our ships to hostile fire. This investment confirms the continuing importance of naval gunfire support and complements MoD expenditure on upgrading and updating the 4.5 inch gun itself."

The British Mk 8 Gun on a RN Type 23 class frigate patrolling the Persian Gulf. The Mk 8 gun will be equipped to fire new longer range ammunition being able to reach out to 27 kilometres – an improvement of some six kilometres or more than one quarter on the shell it succeeds in service.

The £77 million contract for development and initial manufacture of the Improved Ammunition was placed with BAE Systems, RO Defence in June 1997 and sustained 31 jobs in Birtley (Northumberland) and Glascoed (Monmouthshire).

The 4.5-Inch Mark Improved Ammunition round is compatible with both the 4.5-Inch Mod 0 and Mod 1 Gun systems.

Ships to be equipped with the ammunition include Type 42 Batch II and III Destroyers, Type 22 Batch III Frigates and all Type 23 Frigates.

The Improved Ammunition will replace the existing 4.5-Inch Mark 8 Gun ammunition that entered service in 1973. High Explosive rounds and Practice rounds (with an inert filling) will be delivered to MoD in the next five years, with annual "top up" buys to follow on into the third decade of this century.

USS KITTY HAWK turns 43

USS KITTY HAWK (CV-63), currently the US Navy's only permanently forward-deployed aircraft carrier, turned 43 years old April 29, with an under way cake-cutting ceremony to celebrate the beginning of another year in the life of America's oldest active Navy ship.

"USS KITTY HAWK has now served under nine presidents," said Capt. Thomas Parker, KITTY HAWK's commanding officer, as he cut the ship's birthday cake in the aft mess decks. "Construction started on it when Eisenhower was president and concluded when Kennedy was president."

Parker also pointed out that KITTY HAWK has had 32 commanding officers, including himself and had conducted 373,157 successful aircraft traps at the time of the ceremony.

"The ship is like a fine wine; it doesn't get older, it gets better," he said.

Standing alongside Parker as he cut the cake were 10 KITTY HAWK Sailors who shared the same birthday as the ship, April 29, some of whom said they felt great pride at being honored guests at the ceremony.

USS KITTY HAWK was commissioned at the Philadelphia Naval Shipyard April 29, 1961. It is the second U.S. Navy ship named after the town near which Orville and Wilbur Wright flew the first-ever successful, controlled, powered aircraft Dec. 17, 1903. USS KITTY HAWK'S original homeport was San Diego.

Since then, USS KITTY HAWK has participated in operations around international hotspots, such as Vietnam, Korea, the Persian Gulf, the Balkans, Afghanistan and most recently, the war in Iraq.

USS KITTY HAWK took over the mantle of being America's only permanently forward-deployed aircraft carrier in 1998 from USS INDEPENDENCE (CV-62), which was decommissioned that year. Also in 1998, USS KITTY HAWK joined with Carrier Air Wing (CVW) 5 and arrived at its new operating location of Yokosuka, Japan.

After returning May 6 from service in Operation Iraqi Freedom, KITTY HAWK entered an extensive maintenance and drydock period that concluded Oct. 17. The ship soon resumed its role cruising the western Pacific Ocean and is currently conducting operations during its Spring 2004 under way period.

Nuke submariners put ashore

Eleven British sailors were allowed to leave a nuclear submarine after they expressed fears over its safety. The crewmen on HMS TRAFALGAR raised their concerns with the commanding officer who agreed to let them off the boat. A UK MoD spokesman denied any suggestions of a mutiny' on board and said no individual refused to sail with the submarine. The incident took place before the submarine was due to begin operational tests following minor repairs at the Faslane nuclear base, in Scotland.

HMS TRAFALGAR has been out of service since it ran aground off the Isle of Skye, off Scotland, in November 2002. Three sailors were injured in the incident, which caused five million pounds worth of damage.

A temporary replacement crew joined the other 109 members last week after the 11 men spoke of their safety fears last Friday to commanding officer Mark Williams who agreed to release them from duty.

No disciplinary measures are currently being considered against the 11 men, the MoD added.

A court martial hearing last month reprimanded Commander Robert Fancy and Commander Ian McGhie, both 39, for their part in causing HMS TRAFALGAR to ground on the seabed while on a training mission.

The two pleaded guilty to a charge of negligence causing the grounding of the submarine on November 6, 2002.

First fuel cell sub for export launched at HDW

Under the name PAPANIKOLIS, the first fuel cell submarine for export was launched from Howaldtswerke-Deutsche Werft AG (HDW) in Kiel.

The submarine, with the construction number 361, is a 214 Class submarine and has been built for the Greek Navy.

The HDW group is building a total of four of these submarines for the Greek Navy. Of these, the first vessel is being built in Kiel and the subsequent vessels will be built at the HDW subsidiary company Hellenic Shipyards in Greece. The submarines are scheduled for delivery between 2005 and 2010.

The 214 Class of submarines is based on the successful construction principles of the 209 Class submarine, of which HDW have built more than 60 since 1960. It was improved by incorporating the innovations of the 212A Class submarine, principally the unique air-independent fuel cell propulsion system. This provides extremely increased underwater endurance. The minimised acoustic, thermal and magnetic signatures of the submarine provide an unbeatable degree of undetectability. Increased diving depth and overall efficiency provide new operational advantages.

PAPANIKOLIS, the first 214-class air-independent fuel cell propulsion submarine built for export being launched from Howaldtswerke-Deutsche Werft AG (HDW) in Kiel for the Hellenic Navy.

The vessel, with a displacement of 1,700 tons, is 65 metres long and is manned by a crew of 27. The propulsion is provided by a Siemens Permasyn engine, which draws its power supply either from the fuel cells or from batteries that are fed by a diesel generator. Its armament consists of eight torpedo tubes. The vessel has an integrated sonar and weapons control system for navigation and for deployment in active military operations. The principal tasks of the vessel are reconnaissance, intereception and surveillance. It is also capable of being deployed against surface vessels and submarines, for covert operations and for mine laying.

The Greek Navy was the first foreign Navy to order fuel cell submarines from HDW, in February 2000. It was also the first foreign Navy to order 209 class submarines for export from HDW in 1967. It now possesses eight of these vessels. Three of these are scheduled to be refitted at Hellenic Shipyards with a fuel cell propulsion system.

Evangelia Vassiliki, who launched the vessel, is a student and a descendant of the Greek freedom fighter Dimitrios Papanikolis, who, as the very young captain of a tiny vessel, in the Greek War of Independence against the Turks in 1821, destroyed a Turkish battleship ten times the size of his own vessel.

German shipyards to build Portuguese subs

On 21 April 2004 in Lisbon, the German Submarine Consortium GSC signed a contract for the construction and delivery of two 209 PN Class submarines and an option for a third vessel. The client is the Portuguese Government.

The contractor is a consortium consisting of the two shipyards Howaldtswerke-Deutsche Werft AG, Kiel (HDW), Nordseewerke GmbH, Emden (NSWE) and Ferrostaal AG, Essen (FS).

The size of the order amounts to about 800 million EUROs.

In addition to the construction contract, a comprehensive counter trade package was also agreed in an offset contract.

The 209 PN Class submarines are specially designed to meet the requirements of the Portuguese Navy and represent state-of-the-art submarine technology. The vessels, which are some 65 metres in length, have a displacement of 1,700 tons and are equipped with an atmospheric air-independent, fuel cell-based propulsion system. Delivery of the vessels is scheduled to take place in 2009 and 2010.

In obtaining this contract, the German shipbuilding industry is once again demonstrating its position as market leader in non-nuclear submarine construction.

UK purchases enhanced Tomahawks

The UK Ministry of Defence has reached agreement with the United

States Government, under the terms of a Foreign Military Sales case, to purchase 64 Tomahawk Land Attack Missiles (TLAM). Lord Bach, Minister for Defence Procurement, announced on 21 April 2004.

These conventionally armed land attack missiles are the new 'Block IV' TLAM (also known as TacTom), which have a higher specification than our existing – 'Block III' – missiles. As such, they will provide the added ability to retarget or abort mission in flight and will have a Battle Damage Indication capability. They will be capable of being fired from our current Trafalgar-class submarines as well as from the new Astute Class submarines when they enter service.

This decision shows our continued commitment to enabling precision attack at long range against selected targets. In addition, the ability to pre-position the missile covertly in our attack submarines gives enormous flexibility to our forces.

Lord Bach, Minister for Defence Procurement, said:

"I am delighted to confirm that we will be proceeding with the procurement of this vital capability for the Royal Navy. Tomahawk Land Attack Missiles are a key component of our inventory of precision weapons and have made a significant contribution to operations in Kosovo, Afghanistan and Iraq. This announcement ensures that we will stay in line with the latest US developments of the Tomahawk missile and maintain the updated capability throughout the life of the Astute-class submarine."

Taiwan considers ex-USN Spruances

The Taiwanese Navy is considering buying retired Spruance-class destroyers from the US to replace its Knox-class frigates for anti-submarine warfare (ASW), defence sources said recently.

The plan is very likely to materialise because the US Navy has retired most of its Spruance-class destroyers in recent years and other countries have made them available for use.

The Spruance-class destroyer, which uses the same hull as the Kidd-class destroyer about to enter Taiwanese service, is expected to replace the Knox-class frigates for ASW. Both the

The US Navy Spruance class destroyer USS FIFE (DD-991) on her last mission before decommissioning. The Taiwanese Navy is considering buying retired Spruance-class destroyers from the US to replace its Knox-class frigates for anti-submarine warfare (ASW). (USN)

Spruance and Kidd have a displacement of nearly 9,000 tonnes.

The Taiwanese Navy has a total of eight Knox-class frigates, which have been in use since 1992. After serving for over 10 years, they are no longer capable of sustaining a heavy workload. The ships had been in use in the US Navy for around two decades before they were delivered to Taiwan on a lease contract before the navy bought them.

Despite being in bad condition, the Knox ships are still the Navy's most powerful ASW platforms.

The Navy has yet to make a final decision on the purchase of the Spruance-class destroyers since there are still different opinions within the service on the matter.

Not all naval leaders are in support of the plan to buy the Spruance-destroyers. One group of flag officers argues that the Navy more urgently needs smaller warships with a displacement of 2,000 tonnes or lower. For more than a decade, the Navy has been thinking of purchasing smaller warships to establish a high-low mixed-force structure, that is, a combination of larger and smaller warships to cover a wide range of combat duties.

But if the Spruance purchase plan is passed, the Navy's dream of having smaller warships would once again be denied.

Retired Vice Admiral Lan Ling-li, a former Navy Deputy Chief of Staff, said it would be good for the Navy to buy the Spruance ships, considering that they can carry a heavy payload.

"The Spruance has the most powerful ASW equipment. It has the same hull as the Kidd. The Navy's plans for four Kidds, which are to be delivered in the next few years, are to use them mainly for air defence," Lan said.

"But the Spruances will play the leading role in ASW. Besides being powerful in ASW, the Spruance is also large enough to accommodate equipment to be removed from the Knox ships after their retirement," he said.

Erich Shih, a Senior Editor with *Defence International* magazine, said if the Navy chose to buy the Spruance-class destroyers, it would need to buy four ships to replace its eight Knox-class frigates.

Malaysian submarine program on track

Plans to acquire two Scorpene-class submarines for the Royal Malaysian Navy are progressing on schedule, a senior official of Malaysia's submarine program said recently.

Philipe Novelli, the Malaysian Program Director of Armaris Submarine Business Unit, said the first submarine would be delivered in early 2008 and the second in the middle of the same year. Armaris is the French main contractor for Malaysia's submarine program.

"Everything is going on smoothly. We'll deliver the submarines on time as promised," he told Bernama at the

Defence Services Asia 2004 Exhibition in Subang.

The Malaysian Government signed a contract in June 2002 for the purchase of two new Scorpene-class submarines for the Navy costing 1.04 billion Euro (about RM4.78 billion). The new generation medium-size submarines are being jointly built by the French shipbuilder DCN and its Spanish partner IZAR Group.

A ceremony to mark the construction of the hull assembly of one of the two Scorpene submarines was held at the DCN Shipyard in Cherbourg, France, in December last year.

To reinforce its long-term ties with the RMN, Armaris has opened a regional office in Kuala Lumpur.

Tenix going Dutch for RNZN ship

New Zealand's newest and most expensive Navy ship will be built in the Netherlands. Tenix, the Australian defence contractor named preferred bidder for the NZ$500 million contract to build new ships for the Navy, said it would contract out the multi-role ship to a Dutch shipyard.

Tenix Corporate Affairs Manager Liam Bathgate said Merwede Shipyard would build the 8,000-tonne ship, which would then be sailed to New Zealand under its own steam for a final fit-out. Tenix's existing facilities could handle the ship, but the Dutch yard offered the best option. "It makes the best use of the facilities available in order to get the ship to the Navy as soon as possible."

Tenix will also build two 1,500-tonne offshore patrol ship and four 350-tonne inshore patrol ships for the navy.

The Australian business subcontracted much of the work on the Anzac frigate project to New Zealand firms and plans to do the same this time. "We will be using New Zealand companies to the maximum extent possible", Mr Bathgate said. Now Tenix is the preferred bidder, a final round of negotiations will take place.

FFG Upgrade milestone achieved on schedule

ADI Limited's FFG Upgrade Project has entered the next phase of production following the on schedule undocking of HMAS SYDNEY.

HMAS SYDNEY at ADI's Garden Island dockyard in Sydney undergoing installation of the 8-cell Mk-41 VLS. (ADI)

HMAS SYDNEY, the first of the Royal Australian Navy's guided missile frigates to be upgraded, has been moved from dry dock to berthside at ADI's Garden Island facility in Sydney to complete the installation phase. The setting to work of the enhanced combat system has already commenced.

The Upgrade Project is not only a complex integration task that will see the FFG combat systems upgraded to ensure the ships' operational effectiveness against regional threats, but the intrusive nature of the platform work means ADI is effectively rebuilding significant parts of the ship to incorporate the enhancements.

The upgrade represents the first time in Australia that a naval prime contractor has undertaken the roles of both platform and combat system design in-house to ensure proper integration at the whole-of-ship level.

The dry docking saw the installation of four new diesel generators, the vertical launch system housing (including rip out and reinforcement through four decks) and air-conditioning plant. Also installed was combat system equipment including new mine avoidance sonar, electronic support and all upgraded fire control system hardware. ADI built a 3D model of the forward part of the ship enabling any potential system interference to be designed out.

ADI's approach to the removal and replacement of the diesel generators is believed to be a world first for FFGs. After completing trade off studies of various options, it was decided to remove each generator, bed plate and hull structure as a single unit, avoiding the disassembly of equipment onboard and the extensive removal of internal systems. Three generator units were removed through openings in the side plating and the fourth by cutting out the bottom hull plating and lowering it to the dock floor. Reinstallation followed the reverse process.

The land based test site ADI established at Garden Island for the FFG upgrade enabled combat system software integration testing to begin in advance of HMAS SYDNEY being handed over to the company. Further formal combat system development and stress testing of system software was undertaken ashore in May.

The software is scheduled for formal release to HMAS SYDNEY in July for harbour testing. An engineering version will be available to assist in the set to work process. Sea trials will follow the harbour tests with the frigate due for delivery to the RAN in the final quarter of this year.

RN LSD(A) launched

BAE Systems Naval has launched the first of its Landing Ship Dock (Auxiliary) vessels from the Govan shipyard in Glasgow on Friday April 9th 2004.

Lady Sarah Band, wife of Royal Navy Commander-in-Chief Fleet Admiral Sir Jonathan Band acted as sponsor for the ship.

The 176-metre long, 16,000 tonne Landing Ship Dock (Auxiliary) RFA Mounts Bay being launched from the Govan shipyard in Glasgow on Friday April 9th 2004.

The ship, known as RFA Mounts Bay, is the first vessel in the contract to be launched by the Clyde-based warship prime contractor and naval systems integrator.

BAE Systems Naval Ships is working with Swan Hunter, the lead yard for the contract, to produce a total of four vessels for the class.

The 176-metre long, 16,000 tonne ships will deliver the second wave of an amphibious assault ashore. The Bay

class will also carry more logistical support capability and be better equipped to support humanitarian and disaster relief operations than the ships they will replace.

The contract for two vessels was placed with BAE Systems in November 2001 and steel cutting began the following month.

US warships may resume refuelling at Aden

US warships might resume refuelling at the southern Yemen Harbour this year, after more than three years of suspension following the bombing of USS COLE.

"We hope US ships would resume stopping here this year," Brig. Gen. Mastin Robeson of the US-led anti-terror task force told reporters in Aden in April.

He made the comments at a ceremony to launch seven patrol boats supplied by the United States to Yemen's coast guard. The US official would not give an exact date.

A small explosives-laden boat, led by two suicide bombers, as it was refuelling in the Aden on Oct. 12, 2000 rammed COLE. Seventeen US sailors were killed in the attack.

Yemeni officials said last week that six suspected accomplices in the suicide bomb attack would go on trial this week. They said the first group of specialised patrol boats inaugurated yesterday was part of a plan to commission at least 50 boats to help secure the country's 2,000 km coastline on the Red Sea and Arabian Sea.

Naval activity in WA

1 April 2004 saw the French ships FNS LATOUCHE-TREVILLE (D-646) and FNS COMMANDANT BIROT (F-796) arriving at Fremantle for a six-day visit.

244 officers and crew operate the LATOUCHE-TREVILLE, the last of the GEORGES LEYGUES (F-70) class destroyers, commissioned in 1990. The ship is armed with the Exocet SSM and the Crotale SAM system as well as a 100mm gun. Deployed with the ship was a WG-13 Lynx antisubmarine/anti-ship helicopter.

The COMMANDANT BIROT is one of the D'estienne D'orves (A-69) class frigates. Commissioned in 1984, the ship is manned by 90 officers and crew, and also carries Exocet, along with the Simbad SAM system that fires Mistral SAMs.

Both ships were on the homeward leg of a cruise that saw them visit several Asian countries. In March both ships conducted exercises with the Chinese Navy (PLA-N) in the Taiwan Straits with the blessing of the French Government. After their stop in WA both ships returned to their homeport of Brest via the Suez Canal.

After conducting several exercises off the Western Australian coast, including use of the Lancelin bombing range and exercising with HMAS DECHAINEUX (SSG-75), elements of the KITTY HAWK Carrier Strike Group arrived at Fremantle on 22 April. The carrier USS KITTY HAWK (CV-63) with Carrier Air Wing Five (NF), along with the cruiser USS VINCENNES (CG-49), and the supply ship USNS YUKON (T-AO-202) docked at Victoria Quay while the ammunition ship USNS FLINT (T-AE-32) anchored in Gage Roads under tight security.

KITTY HAWK is the oldest ship in the United States Navy and is homeported in Japan. Onboard were VFA-102 'Diamondbacks', who had the first F/A-18E Super Hornet squadron deployed overseas as part of Carrier Air Wing Five.

VINCENNES was on her last visit to Australia prior to her changing homeports from Japan to San Diego this year before her decommissioning in 2005.

During the official reception on board KITTY HAWK on the night of 22 April, 800 guests were told by Rear Admiral James Kelly, Commander of the carrier strike group, that the USN appreciated the warm relationship that they had with Australia, and hoped that it would continue long after their departure.

Many sailors viewed the many ANZAC Day Dawn Services held around Perth, while one hundred sailors from VINCENNES marched in Perth's ANZAC Day parades representing the United States Navy.

The carrier strike group left Fremantle on 27 April heading for more exercises off the island of Guam, before returning back to Japan.

By Ian Johnson

Naval shipbuilding announcement

Defence Minister Robert Hill and Finance Minister Nick Minchin have announced a series of decisions relating to the future of the naval shipbuilding and repair (NSR) sector.

The key decisions, which flow from the Government's consideration of commercial advice provided by independent expert Mr John Wylie of Carnegie, Wylie & Company, are as follows:

Given the significant increase in NSR sector expenditure resulting from the Defence Capability Review, a competitive model is the preferred approach for contracting in the NSR sector with intervention by Government only in exceptional circumstances.

The $4.5-$6 billion Air Warfare Destroyers (AWD) build contract will be brought forward and let before the $1.5-$2 billion amphibious vessels contract while maintaining the in-service dates for these projects set out in the Defence Capability Plan.

It is planned that tenders for the AWD build will be issued later this year with a preferred tenderer to be identified by early 2005. It is planned that tenders for the Amphibious vessels build will be issued in early 2005 with a preferred tenderer to be identified by late 2005.

Tenderers for the AWD contract will be asked to bid on the basis of an alliance relationship with the Commonwealth. An alliance contract will reflect all of the key commercial principles that will govern the relationship and will rely on providing incentives to the parties to minimise costs. Mr Wylie will assist Defence in the development of the detailed terms of the alliance relationship.

The sale of the Australian Submarine Corporation (ASC) will be deferred until after the AWD and Amphibious vessels are in contract to allow shipbuilding industry – including the ASC – to focus on tendering for these projects. As a result, it is unlikely that ASC will be sold until 2006.

While ASC will be permitted to tender for major naval shipbuilding contracts, it must do so on an arms length basis from Government. To ensure this occurs, ASC will be established as a Government Business Enterprise under the Commonwealth Authorities and Companies Act, which will require the company to operate efficiently, earn at least a commercial rate of return and observe a more standardised and transparent reporting framework. Strict procedures governing the relationship between ASC, Defence and Finance will also be put in place.

These decisions mark the commencement of what is perhaps the most challenging naval construction program in Australian history.

The tenders for the naval shipbuilding contracts will be conducted through competitive processes in a fair and open manner and it is the Government's stated preference that they be built in Australia.

With an estimated $6-$8 billion to be spent on the build of AWDs and Amphibious vessels alone, these projects will provide massive opportunities for Australian industry to participate at both the prime and subcontractor level, create new Australian jobs and skills; and strengthen Australia's strategic industrial base.

There is no doubt that all of Australia's naval shipbuilding capability will be fully utilised in the delivery of these projects.

New tanker to replace WESTRALIA

The Navy has purchased a $50 million commercial tanker that will be reconfigured and used to replace it's ageing current auxiliary oiler, HMAS WESTRALIA.

The ship, currently named DELOS, is a brand new double hulled, environmentally sustainable oil tanker. It was built in the Republic of Korea by the Hyundai Mipo Dockyard Company as part of a four-ship build program for the Greek shipping company Tsakos Energy Navigation.

"At 176 metres long and 37,000 tonnes deadweight, the ship is similar in size to WESTRALIA," said Minister for Defence Senator Hill.

"It will be modified so that it has the latest technology and equipment capable of refuelling a range of Navy vessels, including the ANZAC and Guided Missile frigates and the new Air Warfare Destroyers that will enter into service from 2013."

The modifications to the ship will be undertaken in Australia – creating new jobs and consolidating the high-tech and specialised skills of our naval shipbuilding and repair sector. The work will include fitting underway replenishment equipment, inclusion of naval command, control and communications systems, facilities for helicopter operations and accommodation upgrades. It is a testament to the skills and experience of Australian industry that this design and modification production work will be done here.

Senator Hill said the ship was selected from a field of 11 ships on the commercial market that were evaluated in a competitive process. In choosing the vessel, Defence consulted with Teekay Shipping Australia, who provide ongoing technical and commercial assistance in the support of Navy's in-service auxiliary ships.

Subject to final checks, Australia will take delivery of the ship in July. Following delivery, separate competitive contracts will be let for the design and the modification of the ship. Tenders for the design and logistics support package will be issued shortly with a preferred designer to be contracted later this year. Tenders for a repairer/builder to modify the ship will be issued early next year with a preferred repair/builder to be selected by mid 2005. Defence is on track to deliver the replacement oiler capability in 2006 in accordance with the in-service date set out in the Defence Capability Plan.

Senator Hill said the decision to acquire the base ship built upon recent decisions relating to the acquisition of the new Air Warfare Destroyers and amphibious ships.

Milestone for RAN's ESSM

The RAN has accepted 'Operational Release' of its three ANZAC class frigates as equipped with the Evolved Sea Sparrow Missile (ESSM) system.

This important milestone acknowledges the ships' ability to achieve defined operational outcomes laid down in the Defence Preparedness documentation.

Minister for Defence Senator Hill said that the Navy was now confident in the ability of HMAS WARRAMUNGA, STUART and PARRAMATTA to undertake operational employment equipped with this new state-of-the-art weaponry.

The Chief of Navy, Vice Admiral Chris Ritchie, agreed to the Operational Release, recognising that the ships are now providing an important national defence capability and following outstanding results in exercises and real world scenarios and intensive testing and evaluation of the new system.

"Australia is the first of the 10 nations involved in developing the ESSM system to formally reach operational release of the weapon," Senator Hill said.

The ships' main line of defence is now their ESSM system. The missile is specifically designed to defeat anti-ship missile threats and subsequently significantly increases the ability of these three ships to defend themselves.

The ESSM was procured under Project SEA 1428, a $660 Million project which delivered the first missiles in January 2003. The remaining five ANZAC frigates are being similarly fitted with the missile systems under this program."

The Operational Release status does not absolve contractors from responsibilities to address those aspects that still require resolution.

Navy Heritage Centre for Sydney

More than 500,000 items representing a century of Australia's Naval heritage will be displayed in a new Royal Australian Navy Heritage Centre on Sydney Harbour.

The centre will be built in the public access area at the northern end of Garden Island at a cost of approximately $5 million. Work is expected to begin in January 2005.

It will consist of:

- Two converted heritage-listed buildings used formerly as a gun-mounting workshop and a boat shed;
- A landscaped area for large external displays; and
- A café and conference facility.

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Observations

By Geoffrey Evans

COASTAL SHIPPING – DOES THE LOCAL INDUSTRY HAVE A FUTURE?

A Research Paper published in May by the Australian Parliamentary Library "Coastal shipping overview" (No 12 2003-04) has once again invited attention to the struggle for viability by Australia's shipping industry. What, if any, effect the paper will have on the representatives of the people who sit in the nearby legislative chambers remains to be seen.

Numerous articles have been published in *THE NAVY* noting the local industry's problems and stressing the need for a healthy Australian shipping industry if ever the country was to take its place among the world's significant trading nations.

The Parliamentary Library's research paper on coastal shipping is, as the title implies, confined to ships operating around the Australian coast and does not venture into the larger area of overseas shipping; nevertheless there are some common issues such as manning costs, ship standards, safety and most importantly, policies of the government-of-the-day.

The research paper is basically a statement of facts and while pointing out apparent anomalies in some current financial arrangements and suggesting a better way of doing things, does not make firm recommendations; it does however, contain in an appendix a summary of the key proposals of the September 2003 Review of Australian Shipping (IRAS) carried out by Peter Morris and John Sharp, Transport Ministers in Labor and Coalition governments respectively. Matters dealt with by the paper include:

- coastal shipping as a component of the national transport task.
- shipping industry reforms
- other reforms (port and waterfront)
- the Navigation Act and cabotage
- Commonwealth government policies
- defence

As a carrier of heavy and/or bulky cargo – iron ore, bauxite, steel, petroleum products etc – coastal shipping plays a vital part in the national transport task. The local industry however, has much to contend with, not least challenges to cabotage (a policy used in Australia and many overseas countries to limit access to their coastal trade to national operators), higher and more expensive manning standards than many foreign-owned ship operators, ageing ships and policies changing with changes of government.

In the last 20 or so years most governments have attempted to reform the shipping industry and the waterfront:

- the Crawford Report in 1981
- the Maritime Industry Development Committee
- the Shipping Reform Task Force in 1988 and
- the Shipping Industry Reform Authority in 1989 as the overseeing body

The proposals emanating from the various inquiries were generally adopted and resulted in a more efficient shipping industry. Other reforms in ports and on the waterfront, especially since the late 90s and implemented by Federal and State governments, have resulted in an improved industrial relations climate and greater efficiency in cargo handling.

The outlook changed again when the present government took office in 1996 and competition became a major factor in the industrial world. A shipping Reform Group was established in that year and a Reform Working Group in 1998 and for a time even the cabotage provisions of the navigation act appeared to be under threat; this did not eventuate but subsequently protection for local coastal ship operators was weakened by an increased issue of single and continuing voyage permits, allowing foreign-owned and crewed vessels to operate around the Australian coast.

Rather surprising was the "governments" publicly stated "Australia is a shipper nation not a shipping nation" policy, almost as though it was not possible to be both. Many nations including Australia's trading partners Britain, Japan and the United States are traders and ship owners. Apart from liberalising the permit system a consequence of government policy has been withdrawal of fiscal support for the Australian shipping industry.

According to the research paper not all the proposals of the Reform Working Group have been made public: A notable improvement however, was the introduction in 1998 of company employment for ratings, replacing the roster system (industry employment) and enabling better conditions for seafarers.

The paper lists a number of the challenges facing the Australian coastal shipping industry including increasing competition from rail in some segments and a possible shortage of skilled seafarers. On the other hand the government's reluctance to abolish the cabotage provisions of the Navigation Act "will contain the pressure from the issue of permits". It notes "the quality, reliability and safety of Australian flagged vessels are high by world standards, as are the skills of Australian seafarers" and that "shipping has environmental benefits in terms of energy consumption".

A brief reference is made to the Australian (merchant) fleet possibly having a role in future defence and national emergency operations as it did in East Timor. Given the small number of ships on the Australian register and the specialised nature of task and type, it seems to the writer it will be necessary for the ships to continue in their task of transporting essential materials and for the Navy to be able to protect the ships rather than use them for naval purposes.

Finally, the government's response to the key proposals contained in the aforementioned Independent Review of Australian Shipping, commissioned by the Australian Ship-owners' Association, will be awaited with interest by all concerned: However, the industry has heard that it ought not hold its breath awaiting a response.

The Underwater War in the West

By Vic Jeffery, OAM

WA correspondent Vic Jeffery takes a look at a subject that is sure to raise a few eyebrows and 'Letters to the Editor'. Submarine activity off WA during World War II.

One of the oddities of World War II was the seeming absence of enemy activity on Australia's West Coast apart other than the HMAS SYDNEY-HSK KORMORAN battle in 1941.

The strategically placed and bustling Port of Fremantle in Western Australia often described, as "Australia's Western Gateway" was a most vital link to the Indian Ocean. Coupled with the State's nearness to Japanese-occupied South East Asia, this makes it all the more remarkable.

Other than the bombing of Broome, Wyndham, Port Hedland and Exmouth, along with the shelling of Port Gregory, Western Australia was virtually unscathed.

The Port of Fremantle was perpetually crammed during the war years with merchant and naval vessels and its outer harbour, Gage Roads, was a busy anchorage as ships took on bunkers or waited for berths.

Fremantle also had the distinction of being the largest Allied submarine base in the Southern Hemisphere during the war with the first US Navy and Royal Netherlands Navy submarines arriving in early 1942. From 1944 Royal Navy submarines also commencing operations and by December that year there were more than 50 allied submarines operating from the bustling port.

Between September 2, 1939 and December 7, 1941 there were 15 unidentified submarine reports around the Australia coast. The break-up was Western Australia – five, Queensland – four, New South Wales – two, with Victoria, South Australia, Tasmania and the Northern Territory, all one each.

Enemy submarine activity on Australia's East Coast is well documented. But on the West Coast other than several attacks early in the war by Japanese submarines, the shelling of Port Gregory in 1943 and the 1945 sinking of an American Liberty ship by a German U-boat, there is precious little knowledge of Axis activities.

It is seemingly no secret that in early 1942 Japanese submarines charged their batteries under the cover of darkness in Jurien Bay, which ironically had been the designated anchorage for the *IJN* heavy cruiser *IBUKI* from where it sailed to join the Anzac Convoy in 1914.

There is further evidence of Japanese submariners landing at various locations around our vast shoreline, often with no other intention other than finding fresh water.

Then there were the two-seater light Imperial Japanese Navy reconnaissance Yokosuka Glen floatplanes, which made a number of flights over Perth in 1942. The aircraft almost certainly would have been from offshore Japanese submarines with 11 large *IJN* submarines being floatplane equipped at the outbreak of war.

The sighting of a Japanese submarine running on the surface by Army gunners based on Rottnest Island off Fremantle seems a reasonably well-known wartime incident.

The Japanese midget submarine HA-19 beached on the eastern shore of Oahu after the attack on Pearl Harbor. It is believed in some quarters that the Japanese mounted an unsuccessful midget submarine attack on Fremantle

Another was a Catholic priest who reported seeing a submarine offshore near Broome after Aborigines from the Beagle Bay mission drew his attention to the matter.

There is of course the story claiming that Japanese midget submarines unsuccessfully attempted to mount an attack on Fremantle in 1942. A strong story with a good deal of people claiming it happened, but there is no documentary evidence to support the claim.

It is true that the Imperial Japanese Navy did train three flotillas of midget submarines for strikes against the allied ports of Sydney, Diego Saurez and Singapore. The first two occurred and as Singapore fell quicker than expected, the third was not required. If it was diverted to Fremantle, then nobody seems to know?

I have never been totally comfortable with what is generally known about this subject and have heard many stories of strange activities and landings on our western shores during those dark days.

Despite official denials at the time, a member of General Gordon Bennett's coding staff did confirm earlier reports from former service personnel that the "paper exercise" of a planned Japanese invasion of Australia in March 1942 was very real. It seems there was to be a diversionary attack on Darwin whilst the main invasion force was to land on Perth's Scarborough Beach.

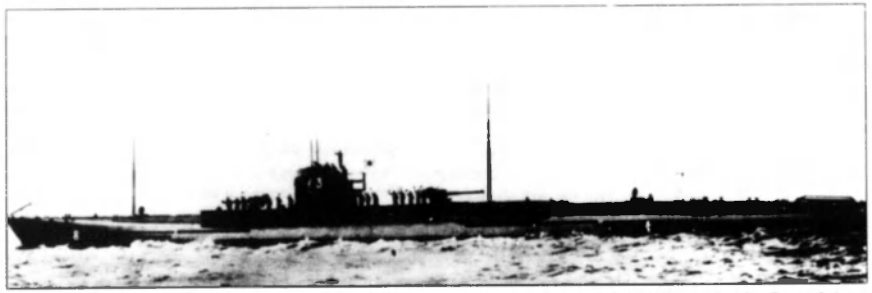
Reports from several Rottnest-based gunners speak of the November 1941 night in which a blacked-out unidentified merchant ship was "sprung" in Gage Roads off Fremantle. Held in the glare of battery searchlights, the 6-inch guns of the mainland Swanbourne Battery coupled with the 9.2-inch guns of the Oliver Hill Battery and the 6-inch guns of Bickley Battery, also located on Rottnest Island were trained on the vessel.

A number of former Army personnel have relayed this story to me over the years, including retired WA Electoral Office Commissioner, Mr Doug Coates, who was the gun aimer on one of the 6-inch guns of Bickley Battery. He has never forgotten the night, being focused on the mystery ship for hours and recalling it was the first time the high explosive shells had been brought up, this was no exercise. From a selection of unidentified photos of the ship Mr Coates described, he without hesitation picked out a shot of the *KORMORAN*.

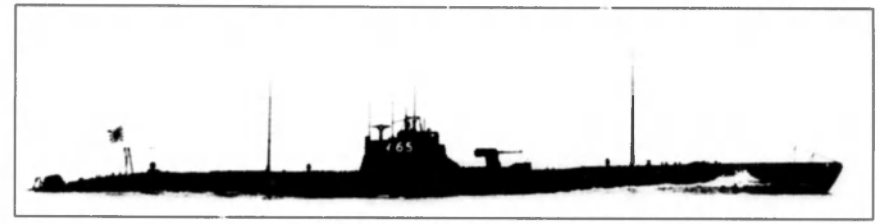
Searchlights, rotated by the various batteries lit the ship and then were doused in case it turned out to be an allied merchantman. Eventually the ship vanished in the dark and could not be re-located. Many ex-Army personnel still believe they could have saved HMAS SYDNEY if they had been given permission to fire on that night. Who knows?

There are more claims of submarine activity off Australia's West Coast than are listed here, but they cannot be verified and therefore have not been included in the following chronology of events relating to mainly Japanese submarines in western waters. Here is a chronological list:

- 4 November, 1941 – Unidentified aircraft were reported flying over Geraldton
- 7 November, 1941 – A similar report claimed unidentified aircraft were reported flying over RAAF Base Pearce. Postwar research suggests they were Japanese floatplanes launched from submarines known to be offshore at that time.
- 5 January, 1942 – The teleprinter in the Signal Distribution Office on the first floor of the District Naval office in Fremantle received and began to printout a signal from the 8160 ton Netherlands general cargo ship *MV TANIMBAR*: "SSSS 1830 – 10920 – *TANIMBAR* – shelling." The attack was carried out 40 nautical miles south of Tjilatjap by the Japanese submarine I-156.
- 11 February, 1942 – At 0505 Western Standard Time the following was recorded in the log of the South West Area Command Headquarters in Fremantle: "From Navy – Report crossing No. 2 loop very good reading and no surface could have made same. Wing Commander McLean notified and ordered an anti-submarine patrol and a search."
- 17 February 1942 – The Imperial Japanese Navy submarines I-2 and I-3 commenced patrols off the West Australian coast.
- 27 February 1942 – In a morning attack in rainy conditions and poor visibility, the Japanese submarine I-3 allegedly fired a torpedo at a merchant ship departing Fremantle which fortunately missed. The ship would have been the Burns Philp *MARLA*, which departed at 0705 or the Blue Funnel Line's *DEUCALION*, which sailed one hour later.
- 1 March 1942 – The small 1172-ton Dutch cargo ship *PARIGI* was torpedoed and sunk by I-2 off Fremantle. The ship was reported missing one month later.
- 2 March 1942 – For the next several days the Japanese submarine I-3 monitored the shipping movements of vessels arriving and departing Fremantle. Positioned off the Perth coastal suburb of Cottesloe to the north of the Port of Fremantle's inner harbour to monitor shipping movements, the submarine submerged during daylight hours and surfaced at night.
- 2-3 March 1942 – The 8988-ton passenger/general cargo ship *SS NARBADA* signalled RAAF Base Pearce repeated to Central War Room in Melbourne "Cargo ship *NARBADA* being attacked by submarine, position 31 degrees 33S 114.11 degrees E. Hudson (bomber) aircraft to locate and attack submarine". This position was 90 nautical miles WNW of Fremantle.
- 3 March 1942- 0200 – Signalled RAAF Pearce with message repeated to Central War Room . . . message received from *NARBADA* begins "Shelled by submarine, returned fire, submarine submerged, possibly hit, proceeding on voyage" The submarine involved was the Japanese I-3.
- 3 March 1942 – A torpedo and gunfire attack saw the Japanese submarine I-1 sink the 8806-ton Dutch steamer *SIANTAR* several hundred miles NW of Shark Bay.



The Japanese submarine I-3 on the surface. The I-3 was one of the first long range cruiser type submarines built by the Japanese based on German designs. The I-3 mounted two 5.5-inch guns, the largest mounted by any Japanese submarine, and was a frequent visitor to WA.



The Japanese submarine I-65 (later known as the I-165) in 1932. I-165 conducted patrols along the WA coast during World War II.

- 6 March 1942 – The Japanese submarine I-3 was patrolling off Shark Bay.
- 11 March, 1942 – The New Zealand Shipping Co. 8719 ton refrigerated and general cargo vessel *TONGARIRO* reported a Japanese submarine gunfire attack (with no hits) at 1105 to the Applecross Wireless Station in Perth: "In position 33 degrees 48S. 113 degrees 20E – Being chased by submarine heading North East, speed 13/14 knots.

Five RN submarines alongside at Fremantle during the closing stages of WW II (via Vic Jeffery)

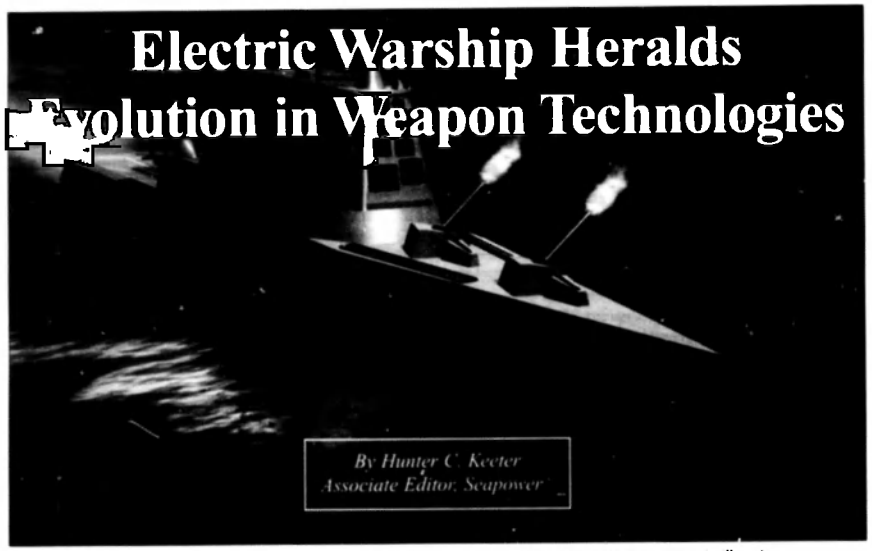
- August, 1942 – The Australian interstate passenger liner *KATOOMBA* was chased and shelled by a Japanese submarine for 36 hours after being intercepted at 1910, 300 nautical miles ESE of Esperance in the Southern Ocean before managing to draw away from the aggressor. The Japanese submarine was the I-32.
- 28 January 1943 – The Japanese submarine I-165 bombarded the small coastal town of Port Gregory, located north of Geraldton, with no casualties.
- 31 January 1943 – US merchant ship *AMERICAN BUILDER* reported sighting a periscope 260 nautical miles NW of Fremantle.
- 7 February, 1943 – The US Navy seaplane tender USS HERON was attacked by an unidentified submarine 190 nautical miles from Geraldton on a bearing of 332 degrees.
- 23 March 1943 – The patrolling corvette HMAS HORSHAM acquired a strong asdic contact near the entrance to Fremantle Harbour.
- 27 March 1943 – The patrolling USS GILES reported sighting a Japanese submarine 55 nautical miles SW of Geraldton.
- 28 April 1943 – The USS WHIPPOORWILL obtained a strong contact with a possible indicator loop crossing in the approaches to Fremantle.
- 16 May 1943 –USS WHIPPOORWILL dropped six depth charges on contact with an unidentified object off Fremantle.
- 27 June 1943 – Unidentified vessel crossed the indicator detection loop in the approaches to Fremantle.
- August-September, 1943 – The Japanese submarines I-165 and I-166 operated off Fremantle monitoring shipping movements through the busy port.
- 8 November 1943 – The patrol vessel USS ISABEL dropped three depth charges after good contact with unidentified submarine crossing the indicator detection loop in the approaches to Fremantle.
- 6 February 1945 – The US merchant ship SS PETER SYLVESTER was torpedoed by the German submarine U-862 some 800 nautical miles west of Fremantle.

There are other claims relating to Axis submarines off Australia's west coast during World War II and I have no doubt a few may just hold a grain of truth. There obviously was strict security in those dark days and reports of submarine incidents were shrouded in secrecy.

If reports of the actual incidents listed do exist perhaps it is time to consider making them public as an important contribution to Australia's military history before they are simply lost in the mists of time.

The German Type IXD U-boat U-862 operated in the Indian Ocean towards the end of World War II and was taken over by the Japanese Navy and renamed the I-502 after Germany capitulated. The US merchant ship SS PETER SYLVESTER was torpedoed by the U-862 some 800 nautical miles west of Fremantle.

Electric Warship Heralds Revolution in Weapon Technologies



By Hunter C. Keeter
Associate Editor, Seapower

The USN's new DD(X) design. The destroyer will be designed to perform multiple missions simultaneously and will employ 'Star Trek' styles of weapons technology.

The US Navy's first integrated electric power system/electric drive warship, the DD(X), arrives in 2011. It is expected to have a surplus of electrical power that will enable the development of advanced weaponry, such as free electron lasers, high powered microwaves and electromagnetic rail guns. The ability to leverage advanced weapon technologies is one reason why naval engineers liken the advent of the electric warship to the shift from sail to steam.

When the U.S. Navy's first integrated power system (IPS)/electric drive warship arrives in 2011 as the DD(X), the service will mark a technological breakthrough that not only signals a new era for naval engineering, but provides huge amounts of electrical power for uses once considered fanciful, such as free electron lasers, high-powered microwaves and electromagnetic rail guns.

Capt. Roger D. McGinnis, director of the US Navy's directed energy and electric weapons program office, said that while the "lethality mechanisms" of high energy weapons are classified, "Our bottom line is that if we can put millions of joules of energy onto a target, something will happen."

In an interview with SeaPower, McGinnis described a variety of effects from these weapons, including "the burning and blinding of an optical system, or cutting an [airplane's] wing off, or causing a fire that results in an explosion."

DD(X) is in development by the US Navy, Northrop Grumman Ship Systems, General Dynamics Bath Iron Works, Raytheon, Lockheed Martin and other firms. When the new ship arrives in service it will be armed with very advanced, but conventional weaponry, including two United Defense 155mm Advanced Gun System cannon and an 80-cell vertical launch system for various guided missiles. But these systems are stepping stones to greater capabilities, according to Michael Collins, Navy IPS/electric drive program manager. "This technology opens the door" to advanced weapons, he said.

In January 2000, then-Secretary of the Navy Richard J. Danzig – now Chairman of the Board at the Center for Strategic and Budgetary Assessments, a Washington, D.C., – announced the Navy would commit to IPS/electric drive and associated technologies for the next generation of surface warfare vessels.

Danzig's commitment may influence the submarine and aircraft carrier communities as well, if prominent leaders, such as the Director of Navy Nuclear Propulsion, Adm. Frank Bowman, have their way. So far, however, the nuclear Navy with its own approaches to power conversion and distribution, has not embraced the DD(X)-type IPS/electric drive mod.

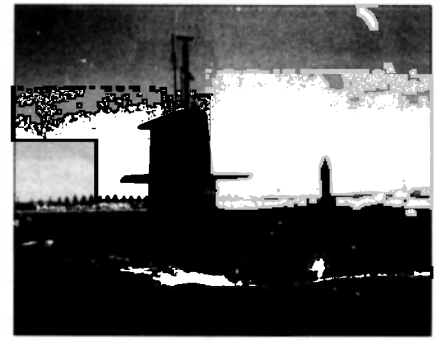
Evolutionary Improvement

An IPS/electric drive system takes raw power generated by engines (also referred to as prime movers), and converts it to electricity, which can be stored by devices such as flywheel capacitors. The electrical power can be distributed wherever it is needed on the ship, for example, to weapons or sensors to electric motors which drive propellers.

That is an evolutionary improvement over present ship designs. Aboard a modern Arleigh Burke-class destroyer, main gas turbines are coupled in pairs to huge reduction gears, providing power for propulsion. This power is not accessible for any other function. Three additional gas turbine engines are used to power an Arleigh Burke-class destroyer's generator set, delivering a total output of about 7.5 megawatts of electricity for the ship's systems.

By contrast, the destroyer-class IPS/electric drive would have four prime movers, which are coupled through generators to an electrical power conversion and distribution system, and to electric motors used for propelling the ship through the water. The IPS/electric drive is capable of providing 10 times the electrical output.

Advanced weapon technologies may one day take advantage of surplus electricity aboard ships, including free electron lasers, high-powered microwaves and electromagnetic rail guns. The first two are directed-energy systems – directing photons in the case of the laser, or radio frequency energy in the case of the microwave – to damage or disrupt a target with variable intensity. The rail gun concept would use electricity and magnetic fields to accelerate a projectile, attacks a target in much the same way as conventional artillery, though with far greater kinetic energy.



The Collins class submarine USS WALLER on the surface. Electric drive is not a new thing for submarines like WALLER as they run on a diesel-electric designed propulsion system which also provides electricity for its sensors and weapons. In the DD(X) example more power will be generated and used immediately as opposed to having it stored in batteries like diesel-electric submarines for later use. (RAN)

IPS/electric drive has set the stage for these advanced weapon technologies, but additional laboratory work and investment are required. According to Fred Beach, a Program Manager in McGinnis' office, advanced electrical weapons are not going to "cost a few million dollars and be developed overnight. These technologies require an investment of $30 million to $50 million over several years."

Potentially, the payoff for the investment is huge. In the case of laser weapons, the lethal effect arrives at a target literally at the speed of light. So today's challenge of developing fire control solutions – plotting a target's speed, manoeuvre and countermeasures against the capabilities of the firing platform's sensors and weapons – could be a thing of the past for strike-group air defense.

"Now all we have to worry about is dwell time: how long do we want to hold the beam on the target to get the desired effect?" Beach said. That fact is particularly compelling to the US Navy leadership struggling with the increasing threat from proliferating anti-ship cruise-missile technology.

While powerful lasers are not based on new technologies, their application aboard ship remains in uncharted waters. The US Navy was first to produce a high-energy laser – the 1970s-era MIRACL located at White Sands Missile Range, N.M. MERACL is a megawatt-class chemical laser with two serious shortcomings – it produces poisonous fumes and lases at infrared wavelengths, which are neutralized by the maritime atmosphere.

Electrically powered free-electron lasers may be tuned to frequencies most effective for operating at sea. The Office of Naval Research is funding development of a free electron laser at the US Energy Department's Jefferson Laboratory in Newport News, Va. By changing frequencies, free electron lasers could perform different functions, from target designation to attack. Additionally, the ship's crew could use the laser emitter tubes – essentially powerful telescopes – as high-resolution electro-optical sensors, for target identification and classification.

Other types of high-energy weaponry may appear sooner than lasers.

Ships could be equipped with high-powered microwave devices, such as those being developed by the US Marine Corps Col. David P. Karcher Jr.'s Joint Non-Lethal Weapons Directorate. Karcher's command is working with the Air Force on a product called the Active Denial System, which is capable of causing pain that can be scaled up from mild heat to an extreme burning sensation. The military wants the Active Denial System to use as a force protection device.

Over the next year, the Active Denial System will be packaged and tested in a vehicle configuration aboard a military Humvee vehicle. It could officially be deployed after 2005. A shipboard application could follow – perhaps useful in future scenarios such as the October 2000 attack on the destroyer USS COLE, when a terrorist bomb killed 17 sailors and crippled the ship.

McGinnis' office also is working on a rail gun that could draw powerful pulses of electricity from a modified EPS/electric drive system to launch projectiles. Propellant is not needed in the rail gun concept because clean electricity launches each round down a rail or through a magnetic coil. The speed with which a rail gun's projectiles travel may deliver thousands of times the kinetic force of a conventional artillery shell, making explosive warheads unnecessary.

Chief of US Naval Operations Adm. Vern Clark, told a Navy League of the United States Sea-Air-Space luncheon audience on April 8: "the rail gun is in our mind and we are investing in it."

Making a Real Difference

While rail guns, high-powered microwaves and lasers are unlikely to replace conventional munitions outright, McGinnis noted that these technologies would likely co-exist on the ships of the future. "If there is no danger of collateral damage and the objective is to blow a target up, then conventional weapons do a great job," he said.

Once operational, however, directed energy weapons could make a real difference for the Navy, McGinnis noted that, despite the range and line-of-sight limitations that make them unsuited for long-range strike, lasers deliver very fine beams that can be precisely controlled. Lasers could be called upon in cases with a high probability of collateral damage, for example, if a small enemy vessel attempts to hide among friendly vessels or other non-combatants.

With the potential to cause horrific damage against a target exposed to full power emissions, directed energy weapons could also emit power on low settings to drive targets away from a conflict area, with no loss of life.

"The military likes having the option that does not cause collateral damage. That lets us engage units that are close to friendly forces and where we don't have to kill, but can simply make the enemy go away," McGinnis said.

Whatever investment decisions are made for weapons the next several years, the US Navy already is engineering the potential these technologies require, according to Collins and his IPS/electric drive team for DD(X).

That team is helping to make practical what Danzig and other Navy leaders, such as Rear Adm. Charles S. Hamilton II, program executive officer for ships, have said: that the acquisition of a IPS/electric drive is like "the shift from sail to steam."

On Oct. 29, 1814, the first U.S. steam-powered warship, the 32-gun Demologos, designed by Robert Fulton, was launched in New York. DEMOLOGOS – scuttled when its magazine exploded in 1829 – contrasted sharply with the most advanced sail frigates of its day, and though under-appreciated by the naval establishment, lit the way to the future.

It took almost two generations for James Watt's practical improvements on Savery's and Newcomen's steam engine in 1769 to inspire the first steam-powered warship. IPS/electric drive, itself not a new concept, may have come of age, according to Philip A. Dur, President of Northrop Grumman Ship Systems.

"The beauty of it is that we will have this 'power surplus' on the ship so that we develop the weapon suites on these ships spirally," he said. "The power surplus is integral to the advantage we have in this ship."

Cruise ships have long employed electric drive because it is less costly to operate than more conventional propulsion systems. In a conventional propulsion system, the engines are accelerated or decelerated to increase or decrease speed. IPS/electric drive de-couples the prime mover from the propeller shaft. Because gas turbines operate more efficiently at higher shaft revolutions, prime movers in an IPS/electric drive can be revved up to their most efficient level of operation and remain there. Electric motors are used to change the ship's propeller speed.

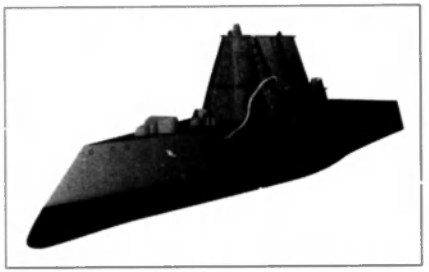
Fuel economy is a key reason why the Navy is investing in IPS/electric drive.

The RN Type 23 class frigate HMS NORTHUMBERLAND
The Type 23 uses a combined gas turbine, diesel-electric propulsion system. It uses gas turbines for speed and diesel generators powering electric motors for range and stealth as this form of propulsion is very quiet, thus aiding in the Type 23's main mission of anti-submarine warfare. (Brian Morrison, Warships and Marines Museum (INT), Franklin Tas)

The U.S. Navy experimented with electric drive in 1911 with the ex-USS JUPITER – converted in 1913 as USS LANGLEY, the first aircraft carrier. Other military vessels are operating today with forms of electric drive. For example, the U.S. Coast Guard Cutter HEALY, built in 1993, is an electric drive vessel powered by diesel prime movers. The Royal Navy's Type-23, new Type-45 and new aircraft carrier programs are designed with IPS/electric drive-type systems in mind.

Development Continues

The Naval Surface Warfare Center, Carderock Division's, Ship Systems Engineering Station in Philadelphia has been putting Danzig vision for a new, state-of-the art IPS/electric drive design into action.



The DD(X) design will be the USN's first integrated power system/electric drive warship. It will also employ new stealth innovations, radars and weaponry. It is expected to be delivered in 2011 (two years before Australia's SEA 4000 destroyer).

The engineering development model for the DDX) IPS/electric drive is to be assembled there by April 2005. Testing of the model is to continue from June to September 2005. DRS and General Atomics have developed permanent magnet motor technologies the Navy will evaluate at Philadelphia. Additionally, other approaches – such as Alstom's advanced induction motor, American Superconductor's high-temperature superconductor and General Atomics' superconducting DC homopolar motor – have attracted naval interest.

Northrop Grumman Ship Systems and its partners are working with the Navy under a $2.9 billion contract for DD(X) that includes the design, manufacture and test of 10 engineering development models.

IPS/electric drive is one of those models. The system will provide 78 megawatts of power to produce electricity propulsion and all of the ship's systems, including advanced sensors and weapons.

Though significant technological and funding challenges remain, additional available electrical power in the DD(X) design has already made it possible for the US Navy to embrace and re-invigorate its programs for advanced weapon and sensor technologies.

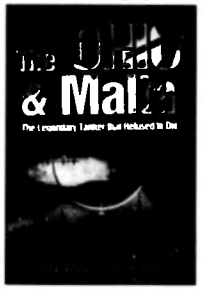
As Collins put it: "If you back off on how much electric power you have on board [new ship designs], then you are almost backing away from the future."

(*) This article first appeared in the magazine of the Navy League of the United States and is reproduced with the kind permission of its Editor

PRODUCT REVIEW

THE OHIO AND MALTA

The Legendary Tanker that Refused to Die
By Michael Pearson
Leo Cooper, distributed in Australia by Peribo.
RRP: $70.00
Reviewed by Vic Jeffery



Two World War II merchant ships have always stood out in my memory as epitomising the courage and spirit of the men who manned those lumbering highly vulnerable ships which were so vital to the free world and the Allied war effort – oil tankers.

The first was the Shell tanker ONDINA which was engaged by two large Japanese merchant cruisers in the Indian Ocean in 1942, sinking one after a lucky shot with its deck gun and then being shelled, torpedoed and left for dead. The crew re-boarded the ship, managed to start the engines and slowly crawled back to Fremantle.

The other, and the subject of this book was Texaco's OHIO also absorbed enormous punishment and simply refusing to die. Built in 1940, at 14,150 deadweight tons and with a speed of 17 knots she was the largest, most modern and fastest tanker afloat at that time.

OHIO's short sea-going career was long enough for the ship to write its name into the annals of the war at sea, being the sole tanker in the large British 1942 fast convoy named OPERATION PEDESTAL, which was to deliver food and fuel, which were so vital to the survival of beleaguered Malta.

The OHIO was selected because Britain did not have a tanker capable of the keeping pace with the 16-knot convoy and it was a direct request from British Prime Minister Churchill to American President Roosevelt, which saw the ship loaned with a UK crew embarking on the Clyde.

Evidence of the vital importance of this 58-ship convoy was evidenced by a naval fleet of two battleships, four aircraft carriers, seven cruisers, 34 destroyers, seven corvettes, three support vessels with an ocean-going tug to escort 14 fast modern merchantmen.

The Germans and the Italians threw everything possible at the convoy, which endured heavy losses but simply had to get through at all costs. The major naval loss was the aircraft carrier HMS EAGLE, which succumbed to four torpedo hits from the German submarine U-73.

A spread of four torpedoes from the Italian submarine AXUM sank the cruiser HMS CAIRO, and crippled both the cruiser HMS NIGERIA and OHIO, which was hit in the pump room leaving her badly damaged with engine problems and limited steering. The ship had a menacing tear in the ship's hull running across the deck and down the hull.

A near miss bomb tore open OHIO's forepeak tank, followed by a German Stuka dive-bomber, which was hit and crashed amidships. Soon after a Junkers 88 bomber was hit whilst making an attacking run on the ship and crashed into the ship's bows.

OHIO's ordeal was not over, taking another large bomb hit and two near misses, causing further damage and ripping off her rudder, yet still she remained afloat, despite the threat of breaking in two.

Eight of the original 14 merchant ships were sunk. The badly damaged OHIO remained afloat and was towed into Malta's Grand Harbour to disgorge her priceless cargo before finally breaking-in-two. Both sections were saved, seeing out the war as a stationary facility in the harbour, this remaining one of the great stories of the war at sea.

FORTRESS THIRD REICH

German Fortifications and Defence Systems in World War II
By J.E. Kaufmann & H.W. Kaufmann with illustrations by Robert M. Jurga
Greenhill Books, London, distributed in Australia by Peribo.
RRP: $70.00
Reviewed by Vic Jeffery

The Atlantic Wall is the best known and the most famous of Nazi Germany's World War II era fortification line in occupied Europe. It ran along the English Channel and from the Arctic regions of Norway to the Franco-Spanish border.

Many large guns pointed menacingly seaward from their fortifications including the three 406mm guns at Battery Lindemann near Calais, the 340mm twin former French naval turret, Battery Cepet near Toulon and a 380mm rail gun of Battery 698 captured at Marignane in Southern France.

Two triple 280mm triple naval turrets, Caesar located at Battery Oerlandet in Norway and Bruno nearby at Battery Fjell, both removed from the battle cruiser GNEISENAU. Included in the book is a photo of turret Caesar as it is today, shows picnic benches and tables erected in front of those massive menacing barrels of yesteryear.

Another photo shows one of the two extant rare naval concrete rotating turrets of Battery Waldam, located east of Calais and which originally housed 150mm guns.

This of course was only one the many fortified defensive lines including the West Wall which was commenced in the 1930s and at the time was one of the most modern of its time. Then there was the hurriedly built East Wall commencing in late 1943, supplementing old forts built decades earlier, in a bid to halt the Soviet Army.

Today, 60 years after the war, there are still thousands of examples of fortifications including U-boat pens, forts, bunkers, flak towers and casemates.

Hitler's changeable attitude to defence and changes in focus saw many facilities spread throughout occupied territories never completed.

Sadly much of the wartime construction force was slave labour from occupied territories and prisoners-of-war living in appalling conditions.

An absolute treasure trove is the best way to describe this 370-page book, which is supported by 88 technical drawings, 17 detailed maps, and over 140 photographs – many never previously published.

Absolutely crammed with information, it includes maps of Adolf Hitler's FHQ (Fuhrer's Headquarters) at Berghof at Obersalzberg and at Tannenberg in the Black Forest near the Upper Rhine.

Some of the other items I personally found of particular interest are plans of the French Lorient and St Nazaire U-boat pens along with those of U-boat Bases in Europe, and the Dora II U-boat bunker at Trondheim, Norway.

This book is a most valuable addition to the history of World War II and a credit to the authors. One can only guess the countless hours of research involved in producing this magnificent reference book, which is laid-out in an easy-to-read format.

Most highly recommended.

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.

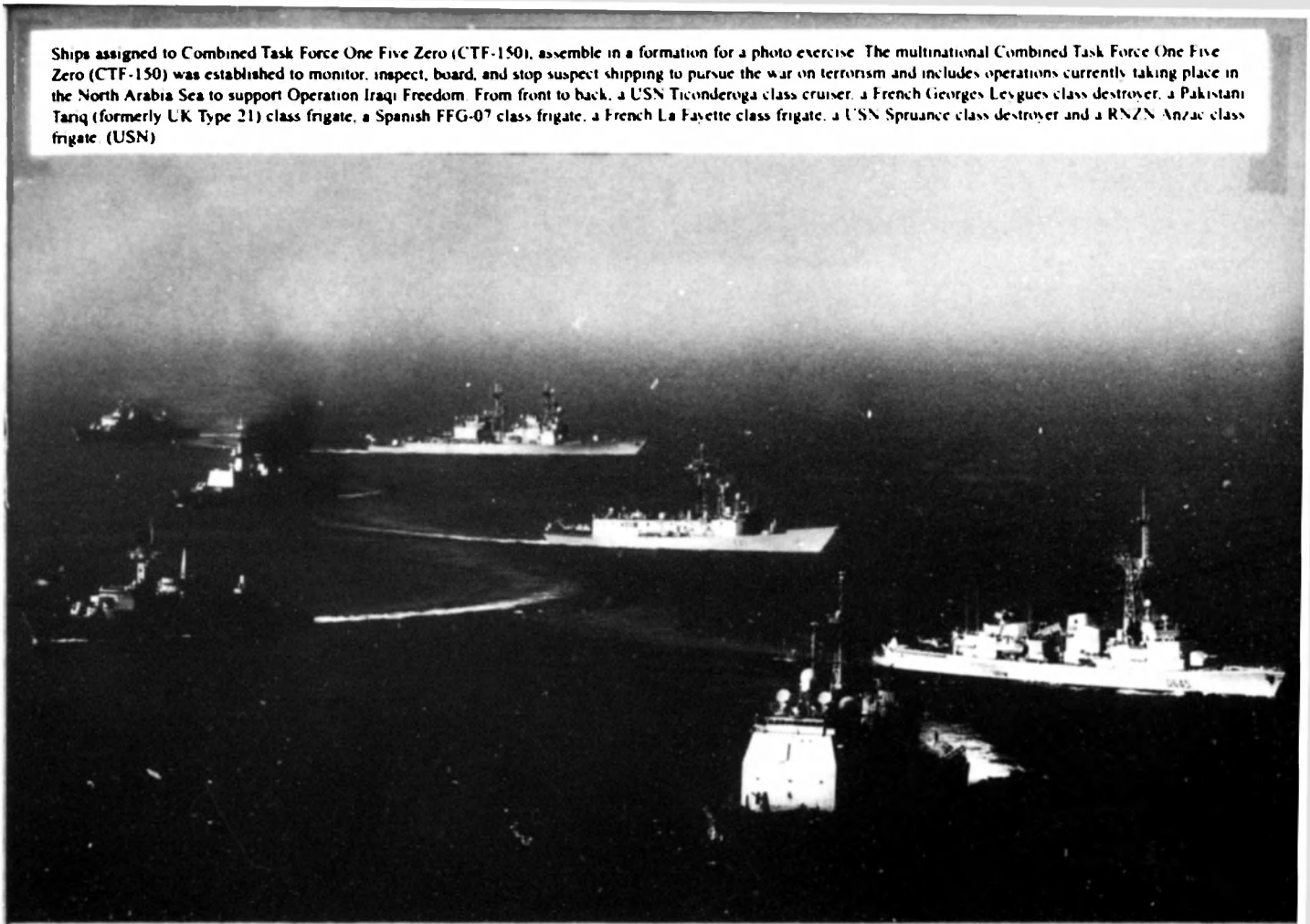
As to the RAN, the League:

- 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.

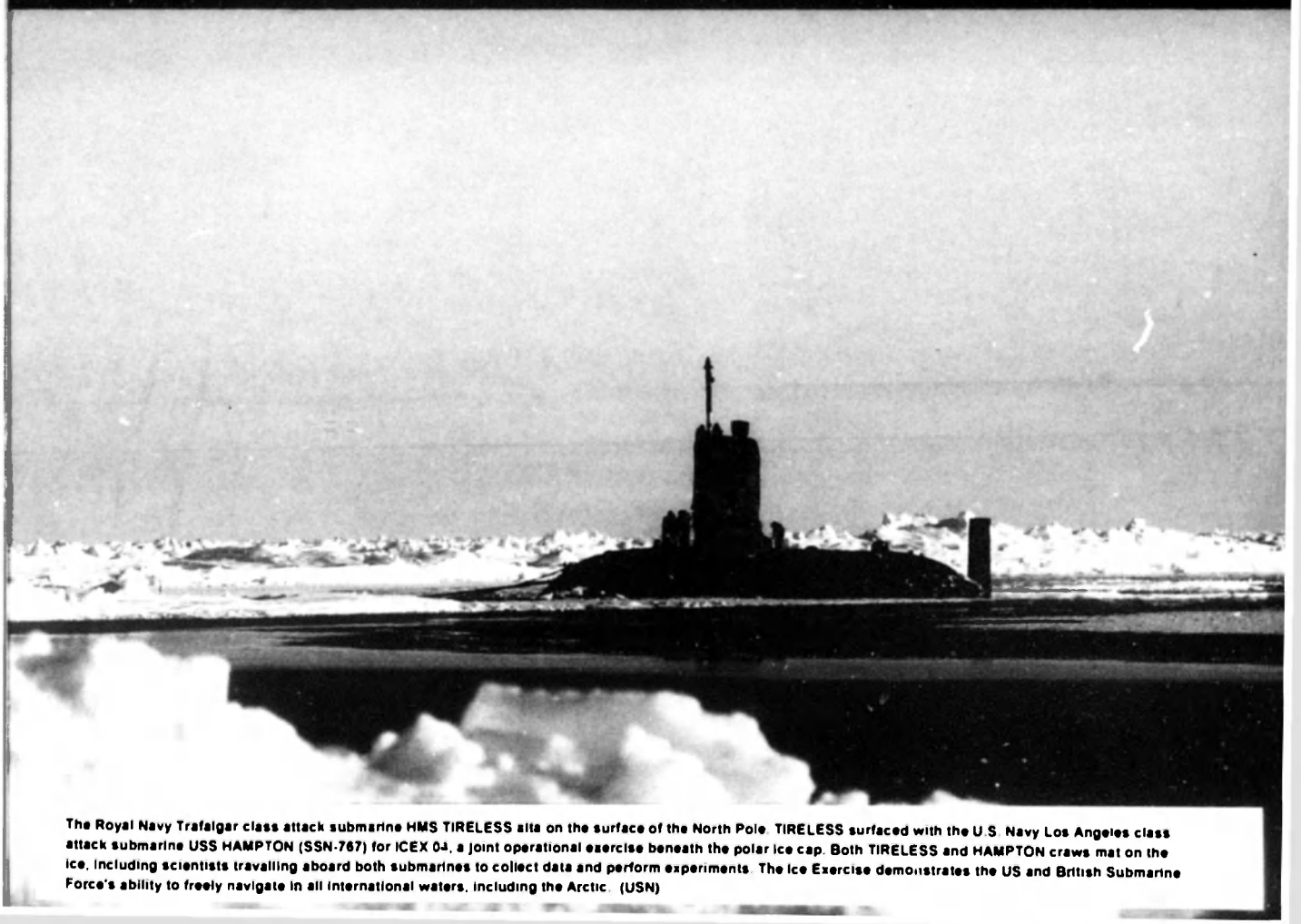
The League:

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.



Ships assigned to Combined Task Force One Five Zero (CTF-150), assemble in a formation for a photo exercise. The multinational Combined Task Force One Five Zero (CTF-150) was established to monitor, inspect, board, and stop suspect shipping to pursue the war on terrorism and includes operations currently taking place in the North Arabia Sea to support Operation Iraqi Freedom. From front to back, a USN Ticonderoga class cruiser, a French Georges Leygues class destroyer, a Pakistani Tariq (formerly UK Type 21) class frigate, a Spanish FFG-07 class frigate, a French La Fayette class frigate, a USN Spruance class destroyer and a RNZN Anzac class frigate. (USN)



The Royal Navy Trafalgar class attack submarine HMS TIRELESS sits on the surface of the North Pole. TIRELESS surfaced with the U.S. Navy Los Angeles class attack submarine USS HAMPTON (SSN-767) for ICEX 04, a joint operational exercise beneath the polar ice cap. Both TIRELESS and HAMPTON crews mat on the ice, including scientists travelling aboard both submarines to collect data and perform experiments. The Ice Exercise demonstrates the US and British Submarine Force's ability to freely navigate in all international waters, including the Arctic. (USN)

Sporting an all over Navy grey livery the RAN survey ship HMAS LEEUWIN is seen leaving Hobart. (Brian Morrison, Warships & Marines Museum (INT), Franklin Tas)

One of the RAN's former inshore Minehunters SHAOLWATER. Both minehunters were recently sold to a Persian Gulf country. SHAOLWATER is seen here being readied to be lifted aboard a merchant ship for transport to the Gulf. (Brian Morrison, Warships & Marines Museum (INT), Franklin Tas)

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THE NAVY

The Magazine of the Navy League of Australia

The Last Gunfight Pt 1

Regional Naval Developments

Australia's Leading Naval Magazine Since 1938

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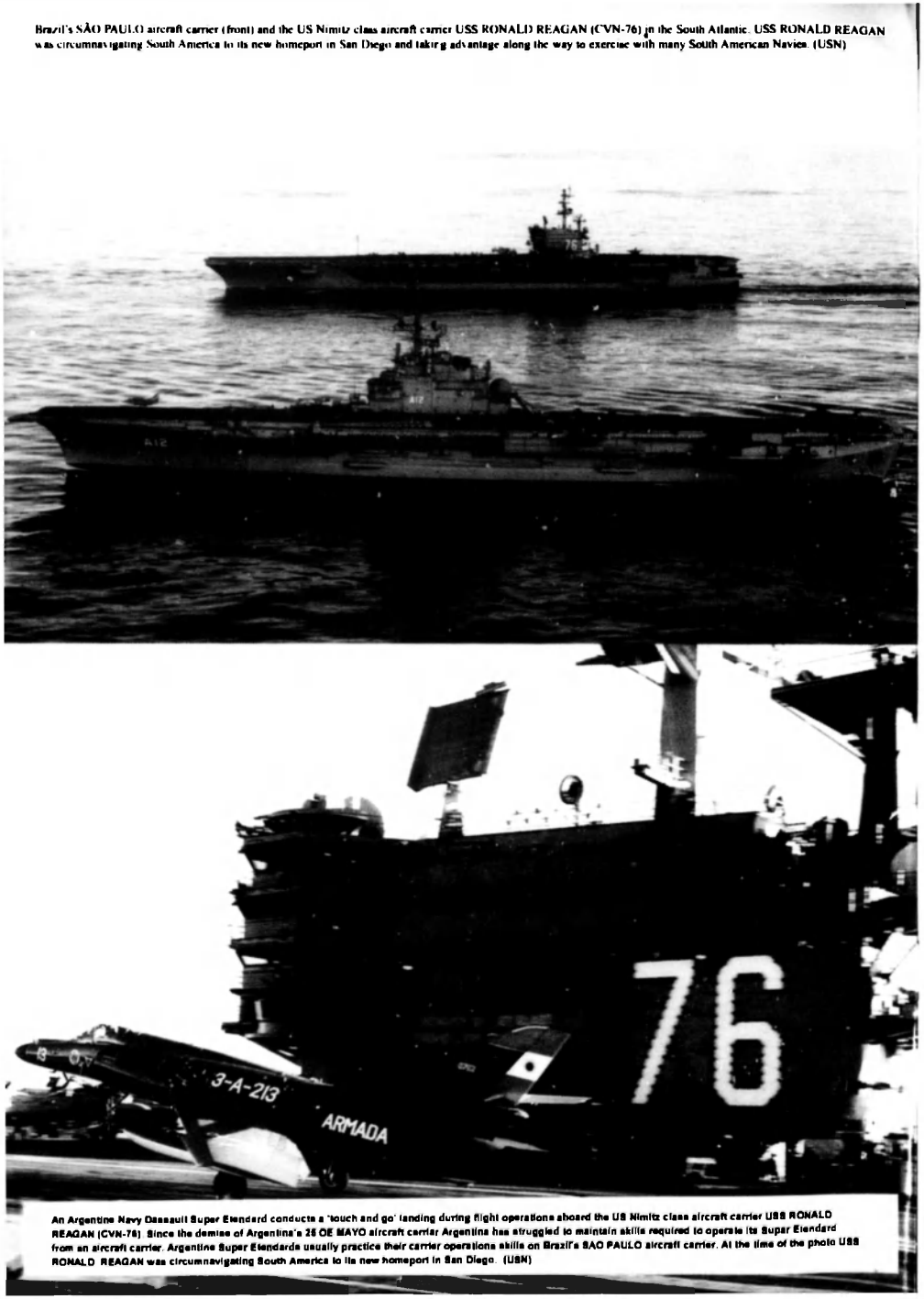
Brazil's SÃO PAULO aircraft carrier (front) and the US Nimitz class aircraft carrier USS RONALD REAGAN (CVN-76) in the South Atlantic. USS RONALD REAGAN was circumnavigating South America to its new homeport in San Diego and taking advantage along the way to exercise with many South American Navies. (USN)



An Argentine Navy Dassault Super Etendard conducts a 'touch and go' landing during flight operations aboard the US Nimitz class aircraft carrier USS RONALD REAGAN (CVN-76). Since the demise of Argentina's 25 DE MAYO aircraft carrier Argentina has struggled to maintain skills required to operate its Super Etendard from an aircraft carrier. Argentine Super Etendards usually practice their carrier operations skills on Brazil's SAO PAULO aircraft carrier. At the time of the photo USS RONALD REAGAN was circumnavigating South America to its new homeport in San Diego. (USN)

THE NAVY

Volume 66 No. 4

Contents

The opinions or assertions expressed in *THE NAVY* are those of the authors and not necessarily those of the Federal Council of the Navy League of Australia, the Editor of *THE NAVY*, the RAN or the Department of Defence. The Editor welcomes correspondence, photographs and contributions and will assume that by making submissions, contributors agree that all material may be used free of charge, edited and amended at the Editor's discretion. No part of this publication may be reproduced without the permission of the Editor.

Front cover: The newly commissioned HMAS BALLARAT at Melbourne's new Docklands Development at the old Victoria Docks, near the City. (Kevin Dunn, Fleetline)

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FROM THE CROW'S NEST

LET EXPERTS DETERMINE EQUIPMENT NEEDS

For many years your Navy League has advocated the development of an amphibious capability in the Australian Defence force – a self-contained element embracing the three Services and able to act independently without resorting to the resources of other countries – and has thus endorsed the current Government's plans to provide the ADF with such a capability. Sadly, as soon as a key component of the amphibious force was approved – the ships required to transport and support the personnel and equipment involved – the project became mired in controversy (the fate of so many major defence proposals) as uninformed critics decided, hurriedly, that Defence had made a mistake.

Australia's armed forces have taken part in numerous wartime amphibious operations. In most cases in conjunction with other countries enabling equipment to be shared, and using temporarily acquired equipment such as converted merchant ships that were returned to trade on conclusion of hostilities or when no longer required. For some time circumstances have required the Defence Force to have multi-purpose amphibious ships permanently available.

The RAN acquired a number of small landing craft ordered for the Army in the early nineteen-seventies and these together with the amphibious heavy lift ship TOBRUK, built to a British design by Carringtons in Newcastle and commissioned in 1981, gave the Navy a limited amphibious capability that has been used extensively and to good purpose ever since. The acquisition of the two LPA's, KANIMBLA and MANOORA, has only reinforced the notion of how vital this flexible capability is. Replacement however, is long overdue.

Australia's defence planners, uniformed and Public Service, are highly trained professionals and it would be foolish to underestimate, or misrepresent, their ability to determine the equipment required to enable sailors, soldiers and airmen to perform their tasks. For example, the decision on the amphibious ship's characteristics was arrived at through the hard learnt lessons of the amphibious phase of the East Timor campaign. As well as three years of Army experimentation, two years of Navy experimentation and one year of Joint experimentation. The new amphibious capability's critics almost certainly did not arrive at their view with any where near the rigour that Defence gave the topic.

Financial considerations may well nullify a recommendation on the capability but ill-considered criticism or political factors should not lead to second-best or inferior equipment decisions.

By Geoff Evans

FROM OUR READERS

NAVAL HERITAGE MUSEUM

Dear Editor

I note your report in the last issue's *Flash Traffic* section regarding the formation of a Naval Heritage Museum in Sydney at Garden Island. That site is well worth preserving and it is pleasing that the Navy has finally decided that its 100 years of Naval collections on Spectacle Island will at last be considered for more formal display.

However, having said that, the prominent fact for all to see is that in the making of this decision we again see a major national maritime (naval) museum being centred in Sydney for the benefit of that State. I would like to express my extreme disappointment at the Defence Minister's announcement, supported by Chief of Navy, that Sydney is to receive this Naval Heritage Museum, taxpayer funded, on Garden Island, Sydney, at a cost of $5M.

A submission had been made to the Federation fund for a Victorian Campus of a Naval Heritage Museum at a cost of $5M, for the 2000/2001 year. The site then chosen was Osborne House, North Geelong, Victoria, historically, had been the prime supporter of the embryo Australian Commonwealth Navy from 1901, supplying and/or hosting:

- Six major vessels of the fourteen vessels transferred from Victoria to the Australian Commonwealth Navy on 1st March 1901.
- The first Naval Training Depot at Williamstown Naval Depot from 1901 to 1920 and its Dockyard.
- The site of the first Australian Commonwealth Navy Office, located in Melbourne, Federal Capital City 1901-1927, where it remained until 1960 when it was transferred to Canberra.
- The Foundation Naval College sited at Osborne House, North Geelong 1913-1915.
- Australia's First Submarine base at Osborne House, Corio Bay, North Geelong 1919-1922.
- RAN's current principal Training Depot, HMAS CERBERUS, which replaced the original Williamstown Naval Training depot in 1920.

Victoria is plainly seen as the foundation focus of the Australian Commonwealth Navy from Federation on 1st March 1901, not Sydney. The present proposal can only be viewed as being anti-Victorian, and indeed anti all other States' legitimate claims.

It is considered that the Australian Commonwealth Naval Heritage Collection on Spectacle Island should be located in Naval Heritage Museum Campuses in all State Capitals, where citizens in all States can have reasonable and ongoing access.

It is observed that the Federal Government funded the National Maritime Museum (NMM) in Sydney, at a cost exceeding $25M, with annual operating costs on top of that, with no discernible effort being made by that body to establish any State based NMM campuses. This new Naval Heritage Museum announcement seems to be an unwelcome extension of this parochial attitude.

I believe that the present proposal for Sydney to keep unto itself all these Australian Navy Heritage Museum items, to the exclusion of all other States, requires immediate review. I consider that this decision should be immediately reviewed so that:

- Victoria, at least be allocated a matching $5M, (for which it had made a previous submission), and a fair share of the Naval Museum collection.
- It is also suggested that other States be given an opportunity to express their views on establishing a Naval Heritage Museum Campus in their own State.
- That Victoria be the headquarters for the proposed Naval Heritage Museum campus proposal, with authority to consult with all States in determining the original distribution of the overall Naval Heritage Museum collection.
- That in distributing the Naval Heritage collection the unique sections, located in State campuses, be part of a regular travelling exhibition, loaned to other State campuses for viewing by the public.

Those responsible for making this decision are supporting two major maritime museums being located in Sydney. This is just plain bloody-minded self centredness to a degree I have never witnessed before. The selfishness of this decision may well damage the long term good standing of the Navy and the Federal Government here in Victoria and possibly in other States.

The manner in which this announcement was made clearly indicates that some people have no feel for the building of a cohesive national ideal where voters in all States are drawn together by careful allocation of Australian historical heritage, in this case – Naval.

I am appalled at the way in which this has developed and hope commonsense and goodwill will prevail.

Yours Aye!

CMDR John M Wilkins RFD RANR
President – Victoria Division Navy League of Australia

ADMIRAL GRAF SPEE

Dear Sir,

I most enjoyed your article on the Battle of the River Plate (Vol 66 No 1 of *THE NAVY*) and the correspondence which followed.

Although we will never know what was in the minds of the German commanders which led to the destruction of the ship – how much they actually knew of the British moves and how much they understood the British attempts to deceive them as to the RN strength in the area – there is one influential piece of evidence – the Germans would have certainly known, their supply of ammunition.

GRAF SPEE mounted more or less battleship guns in a cruiser hull and carried a full load of 600 rounds of 11-inch ammunition. This was usually divided between 200 rounds of bottom fused, 200 rounds of HE and 200 rounds of AP. It is my understanding that all the bottom fused and most of the HE had been expended and some of the AP had been fired as well by the end of the battle and the total available remaining 11-inch shells was about 176, nearly all AP, the least suitable ammunition for a cruiser action.

This would suggest that GRAF SPEE had enough main armament ammunition for a full on naval battle lasting about forty minutes. It is my suspicion that this fact may well have been highly persuasive in convincing the German commanders to take the action they did.

Thank you for the good work you do in producing *THE NAVY*.

Michael Head, *Dr*

RAN CORVETTES ASSOC (NSW) ANNUAL CHURCH SERVICE

Dear Editor,

Our Association will hold its Annual Church Service at the Garden Island Chapel on Sunday, 24 October, 2004 at 10 am. Conducting the service will be Chaplain Dr. Gareth Clayton OAM, MA, RANR. The Royal Australian Navy Band and Colour Party will support the service (medals will be worn). A wreath laying at our Memorial on the Island will follow after morning tea. Approval has been given by the Captain of HMAS KUTTABUL for ex-Corvette men, their wives, families and friends to drive and park near the Chapel, after security gate clearance.

Des Webster
Hon Secretary
RAN Corvettes Assoc (NSW)
28 Inverallan AVE
West Pymble NSW 2073

Notice is hereby given that the

ANNUAL GENERAL MEETING

of

THE NAVY LEAGUE OF AUSTRALIA

will be held at the Brassey Hotel, Belmore Gardens, Barton, ACT

On Friday, 15 October 2004 at 8.00 pm

BUSINESS

1. To confirm the Minutes of the Annual General Meeting held in Canberra on Friday 17 October, 2003
2. To receive the report of the Federal Council, and to consider matters arising
3. To receive the financial statements for the year ended 30 June 2004
4. To elect Office Bearers for the 2004-2005 year as follows:
   – Federal President
   – Federal Vice-President
   – Additional Vice-Presidents (3)
   Nominations for these positions are to be lodged with the Honorary Secretary prior to the commencement of the meeting.
5. General Business:
   – To deal with any matter notified in writing to the Honorary Secretary by 5 October, 2004
   – To approve the continuation in office of those members of the Federal Council who have attained 72 years of age, namely John Bird (Vic), Joan Cooper (Tas), Tom Kilburn (Vic) and Andrew Robertson (NSW).

ALL MEMBERS ARE WELCOME TO ATTEND

By order of the Federal Council

Ray Corboy, Honorary Federal Secretary, PO Box 2063, Moorabbin VIC 3189

Telephone (03) 9598 7162 Fax (03) 9598 7099

ern As
Part 2, Miss

By Dr Roger Thornhill

A 'fire and forget' RAM leaves the launch tube of a 21-round Mk-31 launcher. RAM intercepts its ASM target by homing in on its search radar and/or IR signature. (USN)

In Part 1 of our series on ASMD (Anti-Ship Missile Defence) Dr Roger Thornhill examined the use of guns as a last ditch defence against the modern ASM (Anti-Ship Missile). In Part 2 he examines the missile in ASMD.

To the lay observer the ASM has enjoyed 25 years of perceived superiority of the seas, but like all weapons, weapon's systems and tactics time has produced counters. The best hard kill counter to an ASM is ironically another missile. The modern ASMD-missile is usually 'smarter' than its target and enjoys a level of accuracy, reliability and standoff sufficient to counter all current ASMs.

Most early ASMD-missiles were derivatives of other anti-air missile systems, e.g. the Seasparrow was derived from the air-launched AIM-7 AAM (Air-to-Air Missile) and the Seawolf from the Rapier SAM (Surface-to-Air Missile). These were adequate to the task of basic point defence against aircraft and older missiles as their intended target was usually much larger, flew higher and was less manoeuvrable then the current family of ASMs. As the ASM became smaller so did the problem of detection and thus tracking and ultimately engagement. These older ASMD-missiles may now find it harder to fulfil their intended role. However, today, the importance of ASMD is producing its own specialist systems designed to counter the ASM head on with anti-aircraft being a secondary capability.

The use of a missile for ASMD adds another layer to the defence of a ship, or ships. The ASMD-missile is one of the longer ranged layers in the hardkill category with softkill measures such as ECM (Electronic Counter Measures i.e. jamming) or long range chaff (thin metallic strips designed to seduce, mask or confuse a ASM's homing head) forming some of the first layers of a ship based defence.

Layered defence at sea against ASMs was adopted during the Cold War and was designed to counter massed Soviet anti-ship raids, which were intended to overwhelm the defenders. Soviet ASM radar homing technology was poor and their missiles very large, both of these characteristics combined to present relatively easy targets. Consequently, mass and speed was used by the Soviets to alleviate their lower level of technology and missile size.

One of the main counters to the massed ASM attack was the US invention of the Aegis combat system and SPY-1 radar. This system could detect, track and prioritise over 400 targets and 'see' 360 degrees in 3D. It could also link around a fleet controlling the fleet's various weapon systems and assigning targets. A layered defence was the only way to wear down this type of massed threat. Although in the US model F-14 Tomcats armed with AIM-54 Phoenix missiles with support from E-2C Hawkeye AEW&C (Airborne Early Warning & Control) aircraft formed a very effective first and vital layer. Currently, no Navy has that capability, including the USN as the F-14 and its long-range fire and forget Phoenix missiles are being retired. One of the reasons why this capability is no longer present is the fact that very few air forces can reproduce a Soviet style mass attack, including the Russians, with those that can usually being unable to repeat it.

In the Australian alliance context, any aggressor nation that could threaten the RAN with a massed style of ASM threat could be expected to have more than the RAN to contend with.

Given the counter to mass, ASM's had to become smaller and smarter. In this vein, some are starting to employ counters to ASMD methods and weapons. However, modern ASMD-missiles, even in small amounts can tip the balance in favour of the ship or ships at sea even without air cover.

Merits of Missiles

The use of a missile in place of the gun for ASMD has a number of advantages such as long range, accuracy and effectiveness.

Longer-range engagements are the main benefit of a missile based ASMD. At greater range missile debris, from a successful intercept, has less chance of continuing on as kinetic energy and inflicting enough damage on the intended target to force it to withdraw, thus achieving a similar aim as a hit. Longer ranged engagements also mean time to fire again in case of a miss or malfunction.

Another benefit is accuracy with the ASMD-missile's interception track capable of alteration to compensate for ASM course corrections, particularly common over longer engagement ranges, or evasive manoeuvres performed by the target.

An ASMD-missile can usually employ a larger warhead than a gun projectile as well as smarter fuzing options for proximity engagements giving it a higher degree of effectivness.

The ASMD-missile also gives the ship a back-up anti-aircraft capability, assuming longer ranged systems are unavailable. Systems such as the French SADRAL and US Sea RAM can be 'bolted to the deck' (i.e less intrusive into the ship's design) and provide a higher level of protection against ASMs and aircraft for smaller ships than a gun. This protection means that an attacker must use more of his ASM inventory to overwhelm the defence to be confident in scoring a hit, not that that necessarily equals a kill.

Few nations have such an inventory to overcome the combined ASMD counters of a fleet, making this cheaper form of close range missile defence a cost-effective solution to more expensive and capable systems.

Of course the missile does have limitations and it is important to understand these as the ASMD-missile needs to be employed as part of a layered system.

A missile system usually consumes a high level of weight, space and power from the ship to operate to its full potential. It sometimes also consumes key positions on the ship due to weapon arc requirements. On smaller ships this usually means offsetting another weapon system that could be employed in an offensive or support role for another entity.

The very technical nature of the missile system with its associated electronics for guidance, rocket motors etc can provide a myriad of potential points of failure, unlike the gun which has fewer moving parts. The highly technical nature also means cost.

Once the missile is fired it generally requires time to achieve a safe arm distance given its high explosive cargo. This could be anywhere from 300m to 500m and thus provides a gap in the layered approach that needs another system to fill. The gun can, in most cases, continue firing up until point blank range.

When using a missile for ASMD very few 'rounds' will be available given the missile's physical size when compared to ammunition for a gun. If the gun misses the target then a second, third or fourth round/burst is usually not an issue. With a missile it could be pivotal as an expended ASMD-missile magazine could mean a withdrawal from the battle to reload.

The lower time of flight of the gun projectile compared to a missile usually means there is time to fire more rounds than missiles.

In the ASMD mode some Navies adopt a 'better safe than sorry' philosophy and employ a 'shoot, shoot, look' policy where two ASMD-missiles are fired at each target. While this will more than likely produce a kill it essentially halves the ASMD-missiles available and needs to be kept in mind with a potential adversary's ASM stocks and level of sophistication.

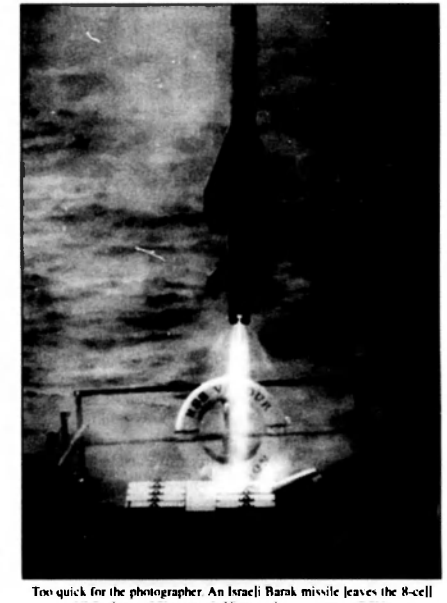
The last major limitation of an ASMD-missile system is the cost. Other weapons could be used in place of an ASMD-missile system that defends the employing platform, or close manoeuvring asset, only.

Despite these limitations, the ASMD-missile is becoming more popular as Navies realise that counters to ASMs are effective and that adding another ASMD layer could mean the difference between effective and ineffective. Although a longer ranged anti-air system is a better solution, as it gives the defender the potential to 'shoot the archer instead of the arrows', they are expensive and beyond the reach of many smaller Navies.

The following is snapshot of some of the more advanced ASMD-missile systems available today that are able to counter the modern ASM.

BARAK (Israel)

The existence of the Barak ('Lightning') missile was first revealed at the Paris Air Show in June 1981. Barak is a relatively low-cost point defence missile system to protect ships against both aircraft and ASMs. It was originally conceived as a conventional lightweight weapon, similar to the British Seawolf, with two eight-round vertical launchers.



Too quick for the photographer. An Israeli Barak missile leaves the 8-cell VLS of one of Singapore's Victory class corvettes. (RSN)

The Barak system consists of the missile, the launcher, and the fire-control system.

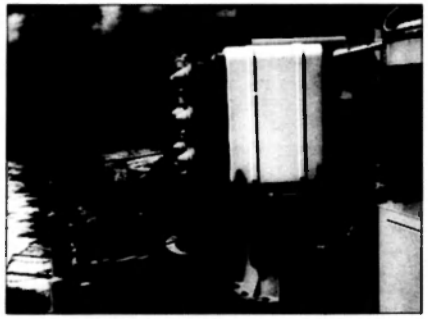
The fire-control system is based upon an I/J and K-band (X-Ka band) monopulse coherent tracking and illumination radar which is supplemented, on the right-hand side, by a thermal imager. Search, acquisition and tracking may be conducted in either I/J (8 to 20 GHz) or K (20 to 40 GHz) bands and it can track a target or targets while controlling two missiles. The system may also be used for controlling guns, with the assistance of a separate ballistic computer.

Upon acquisition of the target/targets by the ship's search radar, the fire-control radar designates the targets. The system automatically calculates the level of threat from each target, allocates a missile or missiles and automatically launches them. In the ASMD role the Barak leaves the launcher and is turned over towards the target by a thrust vector control system. The missile is acquired and controlled by the fire-control radar which then guides it towards the target. The missile is capable of engaging targets 2m above the sea and can manoeuvre at 25g.

Development of the system completed in 1993 with Barak in-service with the Navies of Israel, Chile and Singapore.

MISTRAL (France)

The Mistral man-portable surface-to-air missile system began development in 1977 for a French Army requirement for a man portable low-level air defence system. However, during the late 1980s, consideration was given to a naval version. In 1986 the 'Naval Mistral' system underwent a number of successful trials before being marketed as the SADRAL.



A six-round SADRAL launcher which uses the French 'fire and forget' Mistral 2 ASMD-missile. It is believed that the RAN's Anzac frigates will get two of these launchers each.

In the missile's nose is a two-colour (3 to 5 micron infra-red and ultra-violet) seeker under IR-transparent magnesium fluoride panels. The seeker has a field of view of ±38°.

Behind the seeker, gyro and actuation system is a 2.95kg high-explosive warhead with impact and laser proximity fuse. The warhead consists of 1kg of explosive and nearly 2kg of tungsten balls for improved lethality.

The Mistral 2 variant differs internally with the new missile featuring an improved infra-red seeker with digital processing as well as a new booster. It will be able to carry out all-sector engagements against both high performance fixed-wing combat aircraft and low IR signature targets such as UAVs and with improved performance against ASMs.

A successful intercept of a sea skimming ASM by a French Mistral 2 ASM.

The SADRAL launcher used by the missile is a remotely operated system on a two-axis stabilised mount and is designed to provide self-protection for fast attack craft and ASM point defence for larger warships, when integrated with a radar and/or electro-optic search systems. SADRAL has six launcher-containers and a closed-circuit television camera which is complemented by a thermal imaging camera for night or bad weather operations.

The missile is ejected from the launcher-container by the booster and, once clear, the control and tail surfaces are deployed. The sustainer ignites some 15m away from the launcher-container and burns for 2.5 seconds as the missile homes in on the target. When very close to the target, the missile makes a final correction in order either to hit or to be within lethal range before the warhead detonates. The maximum time of flight is 12 seconds.

Production of Mistral 1 has been completed with 15,000 rounds ordered by 23 countries of which at least 1,500 are for naval use by 12 countries.

Production of Mistral 2 has begun with some 120 Mistral naval systems being ordered. It is understood from industry insiders that Mistral 2 and the SADRAL system may be acquired by the RAN for the Anzac frigate's VSRAD (Very Short Range Air Defence) requirement, with each ship having up to two mounts covering a full 360°.

RAM (US)

The 21-round Mk-31 RAM (Rolling Airframe Missile) launcher is a lightweight, dedicated quick-reaction ASMD-missile system for close-in defence. The system consists of the missile, a launcher, below-deck electronics including launcher control interface and launcher servo control units, and a weapon control panel in the ship's combat information centre.

RAM is based on the Sidewinder air-to-air missile but with significant modifications. In the nose are two RF antennas and an infra-red seeker, as used by the Stinger shoulder launched SAM, with the rear of the missile using the same 9kg fragmentation blast warhead and laser proximity fuse of the Sidewinder.

Targets are designated by shipboard electronic or electro-optical sensors with the data being transferred to the RAM system which assigns a launcher. Radar and electro-optical sensors provide details of target location, distance and speed while the ship's radar warning receiver system inputs data on the ASM's search radar frequency as well as correlating shipboard radar data on location. The missile motor is initiated

A RAM being fired from a new Sea RAM mount. Sea RAM consists of a Phalanx Block 1B CIWS mount but with the 20mm gatling gun removed and a 11-cell launcher cassette used in its place. This system is less intrusive into a ship's space, weight and system limitations and provides a stand-alone automatic fire and forget defence layer against ASMs, aircraft and small boats. (Raytheon)

and drives the missile along a rifling band to ensure that it spins as it emerges from the launcher.

RAM homes in on its ASM target first by detecting and locking onto the ASM's emitting radar seeker, and then switching to an IR homing mode for the terminal phase. The missile is capable of manoeuvring up to 20g in any direction.

The improved Block 1 (RIM-116B) missile features enhanced electro-optics in the missile while a thermal imager is integrated into the shipborne system. The seeker is a wide-scanner with intelligent digital signal processor so the search pattern can be selected before launch as well as providing an IR fall-back option if RF acquisition is lost. The USN's newest Nimitz class aircraft carrier, USS RONALD REGAN, uses four Mk-31 RAM launchers for its ASMD screen.

A new development by Raytheon is the Sea RAM. Sea RAM is essentially a Phalanx Block 1B but with the gun replaced by an 11-cell launcher. It is intended to extend ship self-protection to ranges of 2nm (4km) while reducing the fire control and deck intrusion requirements for a full RAM system.

Some 230 systems have been acquired, or ordered.

EVOLVED SEASPARROW (US/International)

The ESSM is a derivative of the Seasparrow missile used by the USN, and many other Navies, since the 1960s. It is intended to be a dedicated anti-missile missile with anti-aircraft as a secondary mission. ESSM's range, speed, manoeuvrability and accuracy have been improved considerably from the Seasparrow through the use of a tail control and tail mounted thrust vectoring unit to achieve 30g manoeuvres, which is more than enough to intercept the newest Russian 'SS-N-27 Sizzler' ASM even during its supersonic 10g corkscrew manoeuvre.

Externally the ESSM bears a strong resemblance to the 'Standard' missile with the forward part essentially a modified RIM-7P Seasparrow. To increase reaction time no power is required before launch, eliminating the four-minute warm-up required for existing Seasparrows.

In the nose of the ESSM is a radar seeker with low-noise amplifiers to improve the probability of intercepting low

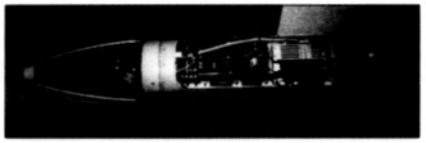
An RIM-7P Seasparrow being launched from HMAS ANZAC. The Anzac class frigates will shortly all be using the new ESSM with 32 rounds capable of being employed in its eight-cell Mk-41 VLS. (RAN)

observable targets. The guidance section is based on that of the existing RIM-7P Seasparrow but includes mid-course guidance.

Modes of operation proposed for ESSM include launch-on-search, delayed illumination and home-all-the-way. Potentially, this will enable each tracker/illuminator to control up to three missiles rather than the existing one missile.

ESSM will remain compatible with the Mk-29 and Mk-48 launching systems. In the Mk-41 VLS, each cell allocated to ESSM will have four missiles per cell instead of one for earlier Seasparrows. This goes some way to alleviating the problem of a 'shoot, shoot, look' policy as instead of eight missiles in eight VLS cells the same eight VLS cells can now house 32 missiles.

A new ESSM during testing. The ESSM system allows up to three missiles to be controlled by the one fire control radar. (Raytheon)



A cut away of the proposed ESSM with IR backup to allow for greater accuracy in high ECM and clutter environments. The IR seeker can be seen at the tip of the missile's nose in front of the semi active homing radar. (Raytheon)

The baseline ESSM will be purely radar-guided although an additional IR seeker is envisaged for later versions to increase accuracy in severe radar jamming environments.

Production is expected to exceed 3,000 missiles with the potential market being for 140 US and 115 foreign warships.

VL SEAWOLF (UK)

Since the Falklands War, where Seawolf proved itself, the missile has undergone a number of improvements. The missile is now employed in the Vertical Launch (VL) mode in order to achieve faster reaction times and greater range.

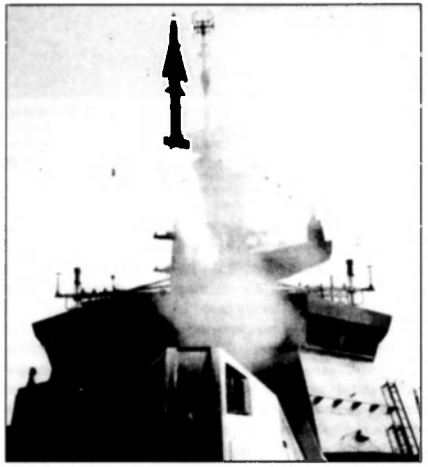
The Seawolf system consists of an air-search radar, two trackers, a missile and a command subsystem.

VL Seawolf is almost identical internally to earlier models but differs externally with a cylindrical booster with square fins attached to the rear. At the rear of the booster is a thrust vector control unit with four blade-spoilers for rapid and reliable control of exhaust gases during the turnover manoeuvre.

Internally the missile consists of a 14kg fragmentation high explosive warhead with an impact-proximity fuse. Behind it is the guidance compartment.

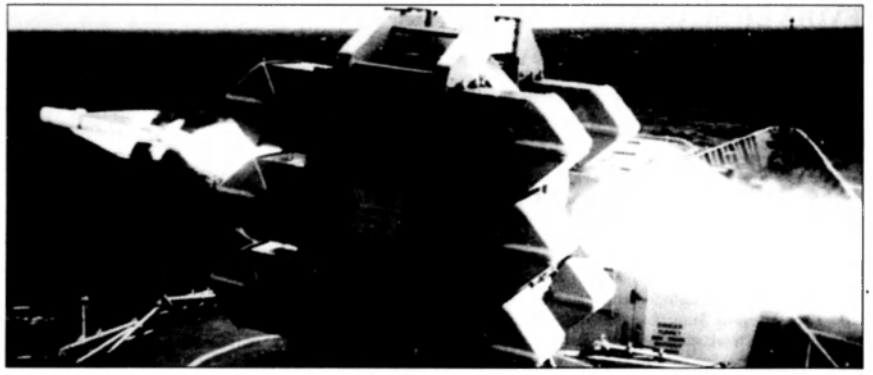
The Seawolf system is completely automatic, although a manual override facility exists, it is able to analyse sensor data, to establish a track, conduct threat analysis then allocate target priorities. There the threat is evaluated and the target is assigned to a tracker which slews towards the target, the tracker searches in elevation until it acquires and locks on to the target to establish a radar line of sight.

When the target is within range one missile is automatically launched, although frequently a second will follow it moments later. After launch the missile is acquired by the wide angle antenna and gathered into the target line-of-sight. Its position relative to the centre of the tracking beam is monitored by the radar, and the shipborne guidance computer generates the necessary steering commands to keep the missile in the centre of the beam until it intercepts the target. The missile's rearward facing antennas help to provide a good ECCM (Electronic Counter Counter Measures) capability. A television camera is used for low-level tracking with flares on the Seawolf showing the missile's location. The standard test of the system is to fire a 4.5-inch shell towards it from another ship. The Seawolf has to intercept and destroy the shell in flight, which it usually does.



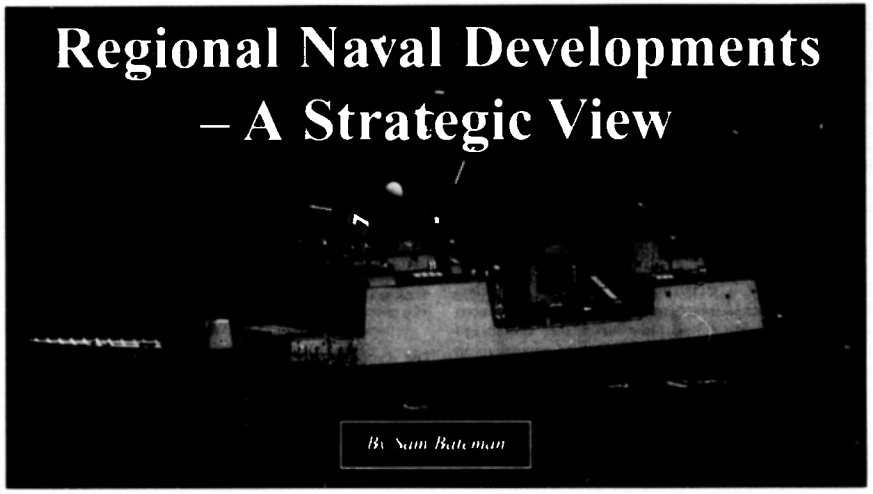
A VL Seawolf missile being launched from one Malaysia's new Lekiu class frigates

Some 33 systems and up to 2,000 Seawolf missiles have been produced or ordered by the RN, Malaysia and Brunei. Although, this list will increase as the RN is paying off three of its VL Seawolf equipped Type 23 frigates.



A Seawolf missile leaving the six round launcher of a RN Type 21 Batch 3 frigate. This was the same system that went to the Falklands war to act as goalkeeper to the Task Force's carriers. After the Falklands War an Exocet missile was used to test Seawolf to ensure it could shoot one down. (RN).

Regional Naval Developments – A Strategic View



By Sam Bateman

One of the first photos of the South Korean designed and built stealthy KDX-II class DDG, YI SUNSHIN, during the recent RIMPAC 2004 exercise near the Hawaiian islands. The KDX-II has a formidable weapons array with (starting from the bow) a Mk-45 Mod 4 127mm gun; a Mk-41 VLS for Standard SM-2 missiles; a Mk-31 RAM launcher above the bridge; eight Harpoon ASMs; a 30mm Goalkeeper CIWS and two medium sized helicopters. (USN)

Much is happening on the Asia-Pacific naval scene. Naval activity levels are high and naval budgets continue to grow with many regional Navies moving into more advanced capabilities and larger warships than they operated previously. While these developments are largely in response to a feeling of increased maritime insecurity, the developments themselves also have potential to add to insecurity in the region.

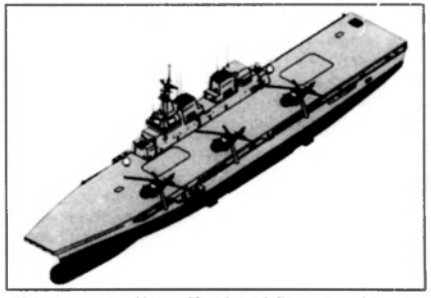
While there are some worrying longer-term implications of the force structure developments discussed in this review, there have been encouraging developments with naval co-operation and confidence building. These allow some optimism about the future. Russia has held joint coast guard exercises with the U.S., Japan and South Korea. China and India held their first joint naval exercise off Shanghai in November 2003. Also during that month the first visit took place by a U.S. warship to Vietnam since the end of the Vietnam War. This visit was associated with a four day visit by the Vietnamese Defence Minister to Washington DC during which military cooperation between the two countries was discussed. Analysts saw this as acceptance by Vietnam of U.S. dominance in the region and of the need 'to go with the flow' of regional co-operation.

Northeast Asia

Northeast Asia remains an unstable part of the region. This is not just a matter of Taiwan and the rogue behaviour of North Korea but reflects lingering bilateral tensions between various pairs of regional countries: Japan and Russia, South Korea and Japan, and China and Japan. There are longer-term strategic implications of strengthened military cooperation between China and Russia that includes sales of high technology naval weapon systems, while Japan remains concerned about the strategic ambitions of China. The unresolved disputes over sovereignty of the Kuril Islands, Takeshima/Tokdo and the Senkaku Islands do not help bilateral relations in the region.

With this ongoing instability, it is not surprising that all Northeast Asian Navies are pursuing ambitious force development and operational plans. Japan has been particularly active in using sea power to extend regional influence. Deployments by the Japanese Maritime Self Defense Force (JMSDF) to support coalition operations in the Indian Ocean and by the Japanese Coast Guard (JCG) to Southeast Asia to assist in dealing with piracy and terrorism are now commonplace. The wider sea power aspirations of Japan are evident in force structure terms with ideas about establishing a sea-based ballistic missile defence capability and in ordering two large "helicopter escort destroyers". These ships will have a fully loaded displacement of nearly 20,000 tonnes and could be equipped with STOVL combat aircraft. They have the potential to fuel fears in the region about Japanese rearmament. Japan's modern and very capable Oyashio class submarines are now operational.

The Republic of Korea Navy (ROKN) also has ambitious force development plans including the acquisition of two large



A computer generated image of Japan's new helicopter escort destroyer.

amphibious assault ships probably of about 13,000 tonnes and capable of carrying up to ten helicopters. The third KDX-II stealth destroyer was recently launched and there are now plans to build three 7,000 tonne Aegis-equipped destroyers by 2012 under the KDX-III program. The KDX-II ships are equipped with SM-2 and Harpoon missiles, RAM and other guns, as well as Super Lynx helicopters. The ROKN's current submarine force is based on the German Type 209-class but three Type-214 class with air independent (AIP) propulsion will enter service from 2007 and larger submarines may follow.

Budgetary problems continue to hamper the modernisation plans of Taiwan's Navy. Due to escalating costs, it has been forced to cut the numbers of surface to air missiles and anti-ship missiles that it is buying with the four Kidd class destroyers from the U.S. Problems have also been experienced with plans to acquire P-3 maritime surveillance aircraft and modern conventional submarines. These developments mean that the naval capabilities of Taiwan are falling behind those of the mainland.

China itself continues to expand its submarine fleet with additional Kilo Class boats and new nuclear-attack submarines probably derivatives of the Russian Victor class. It will acquire a second pair of Sovremenny class destroyers possibly fitted with vertical launch missile systems, as well as building locally designed air defence destroyers. In relative terms, the PLA-N has been the main beneficiary of recent increased defence budget allocations in China. There continue to be rumours of plans to acquire an aircraft carrier capability. This would accord with China's aspirations to become a major regional blue-water sea power. The naval planners in Beijing justify these developments on the basis of China's extensive and growing maritime interests, including the sovereignty claims in the South China Sea, and increasing dependence on energy imports.

Since the collapse of the Soviet Union, the Russian Pacific Fleet has been as much affected by depressed budgets as other elements of the Russian military. It has been through a period of sharp decline in its order of battle with its submarine fleet, for example, declining from 54 units in 1995 to about 17 at present. However, in pursuance of new naval doctrine based on realistic budget expectations, the Pacific Fleet is seeking to regain some of its former influence and has embarked on recent out-of-area deployments and ambitious exercise activities.

International naval analysts remain sceptical about whether it will be possible to transform the Russian Pacific Fleet back into a significant strategic force. The problems of under-funding and morale may be simply too large. Nevertheless, the 'trump cards' still available to Russia are its nuclear weapons capability and high-tech weapon systems. The Russian Pacific Fleet has increased the frequency of its nuclear exercises in recent years and this has led to speculation that nuclear weapons are still considered the main means of curbing the U.S. in any possible conflict in East Asia.

Southeast Asia

Southeast Asian countries recognise the potential for maritime threats and the strategic implications of their location viz-a-viz major shipping 'choke points'. They seek to develop maritime forces (ships, aircraft, and submarines) with a potentially powerful capability for sea control in the region.

Malaysia's first Meko A100 class offshore patrol vessel (OPV) in Germany being prepared for shipment to Malaysia for fit out. It is not expected that all 27 originally planned OPVs will be acquired.

The platforms and weapons being acquired are capable of operations over wider areas and longer ranges than was the case with previous generations of systems.

The Republic of Singapore Navy (RSN) is the technological trendsetter among Southeast Asian Navies. While Indonesia has operated a small submarine fleet for many years, the RSN 'upped the ante' in the late 1990s with the acquisition of four Sjormen class submarines from Sweden. The first entered service in 1998 and the fourth will be operational in 2004. The first of the RSN's new blue-water frigates, RSS FORMIDABLE, was launched in France on 7 January 2004. The other five vessels of this class will be built in Singapore. These ships are highly capable, designed to be stealthy and equipped with advanced combat systems, including Harpoon missiles, the Aster Anti-Missile Missile (AMM) system and an advanced ASW suite. Along with the submarines, these vessels demonstrate the preparedness of the RSN to operate well beyond the immediate confines of the Singapore Strait and its approaches.

In Malaysia, the Meko A 100 class offshore patrol vessel (OPV) building program continues on track with the first vessels entering service this year although reports suggest that not all 27 vessels originally in this program will be acquired. Malaysia is also buying two Scorpene class submarines, which are based on a proven French design. The 1,500 tonne Scorpene is new-generation medium-sized conventional attack submarine with capabilities for missions ranging from anti-submarine and anti-surface warfare to special operations and intelligence collection. To be based near Kota Kinabalu in Sabah, the first Scorpene will be delivered in 2007 and the second a year later.

A roughly fifteen per cent increase in Thailand's defence budget was announced in September 2003. However, the Thai Army and Air Force appear likely to have the major share of this increase rather than the Royal Thai Navy (RTN).

With the Indonesian economy still struggling after the economic collapse of the late 1990s, Indonesia's Navy remains hard-pressed to meet the security requirements of a far-flung archipelago. However, it hopes to reverse the downward capability trend as soon as possible. New submarines might be acquired possibly from South Korea. Indonesia's major surface combatants at present are six ageing frigates transferred from the Netherlands in the late 1980s and three smaller Dutch-built Fatihillah class frigates of more recent origin. However, two new corvettes have been ordered from the Netherlands (see *THE NAVY* Vol 66 No.2, p16).

Indonesia could now be regarded as potentially a good market for foreign shipbuilders as China, South Korea and Italy are also believed to have offered surface warships to the Indonesian Navy.

Despite being an archipelagic country with extensive maritime interests and conflicting claims to sovereignty in the South China Sea, the Philippine Navy remains the weakest Navy in Southeast Asia. Its major units are an obsolete former USN frigate and three ex-RN Peacock Class patrol boats. The U.S. is to transfer a Cyclone class patrol vessel to the Navy and Tenix in Australia has built several patrol boats of various sizes for the Philippine Coast Guard.

South Asia

As was demonstrated by the recent successful meeting of the South Asian Association or Regional Cooperation (SAARC), the security outlook in South Asia appears more optimistic than it was just a year or so ago. There have been some positive confidence building developments between India and Pakistan and the internal security situation in Sri Lanka appears contained for the time being. However, the Andaman Sea has been the scene of a fairly high level of illegal activity, including illegal fishing and drug smuggling. It begs an increased level of co-operation between littoral Navies and coast guards to provide law and order at sea.

India has long had the most powerful regional Navy in the Indian Ocean but is now seeking to extend its maritime influence eastwards. India is to re-establish a credible aircraft carrier capability with the recently approved acquisition of the Russian carrier ADMIRAL GORSHKOV (at a reported cost of US$652 million) and by building another vessel locally. It will further develop its large fleet of powerful surface combatants with Talwar class frigates built in Russia and other vessels built locally; and modernise its submarine fleet with the likely purchase of six Scorpene submarines from France and the rumoured lease of Akula class nuclear attack submarines from Russia.

India's role in the region has been boosted by the developing strategic relationship with the U.S. that includes a strong naval dimension. Regular exercises are taking place between the U.S. Navy and the Indian Navy, including a major exercise in the Arabian Sea in October 2003 involving an American nuclear submarine. The Indian Navy has also cooperated with the U.S. Navy in escorting high value shipping through the Malacca Straits.

With the exception of its submarine fleet, which includes three Agosta 90B class conventional submarines equipped with SM-39 sub-Exocet anti-ship missiles, Pakistan's Navy operates mainly obsolete vessels. There have been reports of Pakistan negotiating to buy an unspecified number of F-22 frigates from China to replace the two old gun-armed Leander class frigates. Prior to the present detente with India, Pakistan's Navy announced plans to acquire nuclear weapons but it was not clear how it would deploy such missiles.

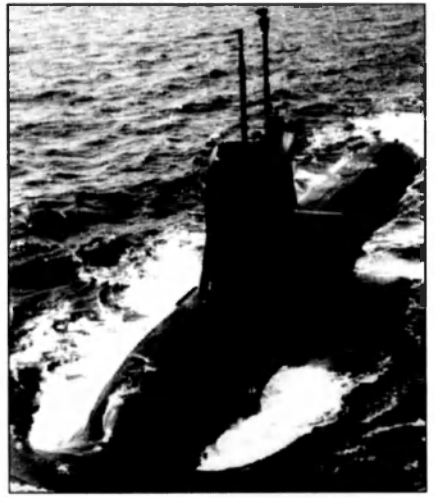
United States

The U.S. Navy is truly a global Navy. It remains the dominant naval power in the region and is maintaining a high-level of coalition-building activity throughout South and East Asia. Sea Power 21 is the vision of how the U.S. Navy will meet its new priorities of Homeland Security and the War on Terrorism. This requires enhanced war-fighting capabilities

The former USS SCOTT leaving Sydney Harbour. Taiwan has bought all four Kidd class destroyers and expects to have them in service some time next year. (Brian Morrison, Warships and Marine Corps Museum International, Franklin, Tas)

with new concepts, technologies, organisational initiatives, and improved acquisition processes. It is based on three main operational activities (Sea Strike, Sea Shield and Sea Basing) but includes additional elements of sensor, weapon and platforms integration (FORCENet), resources and funding (Sea Enterprise), research and development (Sea Trial) and the management and morale of human resources (Sea Warrior). These have a lot of terminology relevant only to the U.S. Navy and this is indicative of the gulf opening up with naval technology and doctrine between the U.S. Navy and other Navies.

Sea Strike is focused on offensive operations. It involves strike aircraft and cruise missiles, as well as Marines, information warfare operations, Special Operations Forces, and the joint strike capabilities of the Army and Air Force. New capabilities include Ohio class ballistic missile submarines converted to carry cruise missiles, CVN(X) nuclear-powered aircraft carriers, and new DD(X) destroyers with powerful surface strike capabilities.



One of the RSN's four Sjormen class submarines acquired second hand from Sweden. All four are expected to be operational this year after extensive modification in Sweden to update and 'tropicalise' them. (RSN)

Sea Shield provides layered defence to protect the homeland, sustain access to littoral areas, and protect coalition and joint forces even in distant parts of the globe. Key elements include advanced sea-based ballistic missile defence provided by new CG(X) class ships, littoral control capabilities, new mine countermeasure capabilities and enhanced ASW particularly against modern, quiet diesel submarines. Littoral sea control is a major mission under Sea Shield. The Littoral Combat Ship (LCS), in which Australian ship designers have taken an interest, will provide much of the required capability. It will be designed modularly so that it can be reconfigured fairly quickly to perform one of three missions: ASW against quiet diesel submarines operating in crowded, noisy and shallow coastal waters; mine countermeasures; and countering swarm attacks by small, high-speed boats armed with missiles.

Sea Basing exploits inherent advantages of sea-based forces to operate over the horizon and without dependence on foreign bases. Expeditionary operations and amphibious warfare capabilities are fundamental elements. A new class of amphibious assault ship, the LHA(R), will be designed to operate the STOVL variant of the F-35 Joint Strike Fighter and tilt-rotor V-22 aircraft, and to provide forward basing for special forces. Along with the LHA(R), the U.S. Navy is also developing new concepts for maritime pre-positioning, high-speed sea-lift, and amphibious capabilities.

The U.S. Navy's Global Concept of Operations is a major manifestation of globalisation and maritime power. It puts a clear emphasis on providing naval striking power around the globe. It is based on new packages of naval forces that improve the ability to generate combat power simultaneously in different parts of the world. Reorganised carrier strike groups will have fewer surface combatants and attack submarines than a carrier battle group and expeditionary strike groups will include a strike capability provided by surface combatants and a submarine, as well as amphibious ships. The number of ships assigned to the Pacific Fleet will be increased and the Atlantic Fleet downsized.

The overseas military deployment policies of the U.S are currently under review to ensure they meet new requirements of mobility and flexibility. This might mean possible reductions in forces based in East Asia in favour of smaller, more agile forces deployed from continental U.S. or from an increased number of smaller bases overseas. These forward operating bases will be located in the vicinity of possible 'hot spots'. They are being built or expanded in countries such as Qatar, Bulgaria and Kyrgyztan, and in the American territory of Guam. There is a major need for bases on or just off the East Asian littoral – in the Philippines, Singapore and elsewhere in Southeast Asia. These are not to base forces under a permanent arrangement but to ensure that access is available when required. An American base of this nature may be established in Darwin in northern Australia.

Oceania

The Royal Australian Navy has emerged from several years of high operational tempo in good order and with a major force development program approved. This includes the projected acquisition of three air warfare destroyers (AWD), two large multi-purpose amphibious landing ships with a new class of sea-lift ship to follow in the longer term, the second hand purchase of a ship to replace the aged tanker HMAS

Two MV-22 Osprey tilt-rotor aircraft conducting proximity trials at sea aboard the LHA USS IWO JIMA. The US is pressing ahead with this revolutionary new aircraft despite some early setbacks. (USN)

WESTRALIA, and a new fleet of 12 Armidale-class patrol boats, bigger and more capable than the current fleet of Fremantle-class vessels. Meanwhile the maritime unit of the Australian Customs Service (ACS) moves closer to becoming virtually an Australian Coast Guard with the projected acquisition of a specially equipped vessel to undertake fisheries patrols in the Southern Ocean.

Air defence is a major concern of the RAN consequent to it having lost its area air defence capability when the last of the Charles F. Adams class DDGs was retired in 2001. The air warfare capability of the youngest four of Australia's six FFG-7 frigates is to be improved by adding the SM-2 missile to their current modernisation programme. However, the two oldest ships of this class will be retired from 2006 when the last of the eight Anzac class frigates is delivered. The AWDs to enter service around 2013 might have a modest sea-based ballistic missile defence capability with the U.S. Aegis system and SM-2 missiles although the upgraded SM-6 missile is not ruled out.

New Zealand's two Anzac class frigates, HMNZ Ships TE KAHA and TE MANA, have been leading busy operational lives since they commissioned. Their activities have included overseas peacekeeping deployments and sovereignty patrols in the South Pacific and Antarctic. Project Protector is a NZ$500 million project providing the RNZN with a new multi-role vessel (MRV), up to three offshore patrol vessels (OPV) and up to five inshore patrol vessels (IPV). The MRV will be a long-range, high endurance patrol vessel with capacity for tactical sealift and logistic support.

In the South Pacific, the life extension program for the 22 Pacific Patrol Boats (PPBs) supplied by Australia to 12 Pacific island countries (PICs) during the period 1987-1997 is now well underway. The PPB project has been an outstanding success with major benefits both for Australia and the PICs themselves. The PPBs have been useful for a variety of tasks, including search and rescue, medical evacuations and disaster relief, as well as the fisheries surveillance mission for which they were intended.

European Navies

It may seem strange to include European Navies in this review of naval developments in the Asia-Pacific but certain realities of the contemporary world dictate that they should be included. For better or worse, the process of maritime globalisation is now upon us. Partly this is due to the threat of terrorism but more generally, the Europeans are following the Americans into recognising that globalisation means that actions on the other side of the world could be important to them and to their economies. Plans to establish a NATO response force based on high readiness sea, land and air units for 'out of area' operations are indicative of a new interventionist attitude.

Expeditionary forces and naval power projection capabilities, including large amphibious ships, land attack cruise missiles and versatile surface combatants to exercise control in littoral areas are not just the monopoly of the U.S. Navy. Germany, Italy and Spain are following this approach, as well as the main European Navies of Britain and France. France in particular already maintains a significant naval presence in the Pacific and plays an active supportive role in regional arrangements for maritime surveillance and enforcement.

The Proliferation Security Initiative (PSI) initiated by the U.S. is a manifestation of maritime globalisation. It has the objective of intercepting and if necessary, detaining ships and aircraft suspected of carrying weapons of mass destruction and associated materials. PSI is a global plan and the preponderance of European and North American nations as its active participants can only be interpreted as a declaration of the preparedness of these countries to operate, if necessary, into the waters of the Asia-Pacific. With the exception of Australia, Canada, Japan, Singapore and the U.S. itself, the other PSI members are all Europeans.

Conclusion

The international system is going through a period of dramatic change. It has become trite to observe that the world changed forever on September 11, 2001. However, the changes are not only in response to the threat of terrorism but also include other consequences of globalisation and interdependence. These changes underpin naval developments in the region, including a more evident concern for the security of shipping and seaborne trade and the actions initiated mainly by the U.S. to deal with maritime terrorism and the threat of weapons of mass destruction. The moves by China, Japan, India and Russia to use their Navies and coast guards to extend their regional influence and the no longer remote possibility that European Navies could become involved in the region might also be seen as consequences of increased globalisation and interdependence.

Globalisation is much more than just an economic phenomenon. It also has significant security implications. Regional naval developments can no longer be assessed purely in the context of the region itself. This is not just a matter of terrorism being a global threat but also flows from the nature of world trade and the international arms industry with European and North American companies competing aggressively for the Asian naval market. Then there is the contrast between on the one hand, the focus of Western Navies on littoral operations and expeditionary forces and on the other, regional Navies developing more powerful sea denial capabilities to defend their littoral. While current naval developments proceed, the possibility that these strategic cultures could clash at some time in the future is not entirely fanciful.

The Author

Dr Sam Bateman retired from the RAN as a Commodore in 1993 and became the first Director of the Centre for Maritime Policy at the University of Wollongong where he is now a Professorial Research Fellow. His naval service included four ship commands, five years in Papua New Guinea and several postings in the force development and strategic policy areas of the Department of Defence. His current research interests include regional maritime security, strategic and political implications of the Law of the Sea, and maritime co-operation and confidence building. He is Co-Chair of the Council for Security Co-operation in the Asia Pacific (CSCAP) Working Group on Maritime Co-operation and a member of the International Sea Lines of Communication (SLOC) Study Group.

The Flight IIA Arleigh Burke class guided missile destroyer USS BULKELEY (DDG-84) cruises the Arabian Gulf. The Flight IIA will be the last destroyer class built before the new DD(X). (USN)

Flash Traffic

Govt playing safe on new Amphibs

French shipbuilding group Armaris and Spanish shipbuilding group IZAR have been asked to participate in a tunded risk reduction and design study for the RAN's two new LHD amphibious vessels.

The Defence Minister, Senator Hill, said the study was a further step towards the selection of a new amphibious ship design to replace HMAS TOBRUK and the LPAs KANIMBLA and MANOORA.

A computer generated image of the French Armaris Mistral design. Armaris recently changed its offer by adding a 'stretched' version of its Mistral design to try and meet the Army's amphibious requirement. (Armaris)

The $2 billion project will equip the Australian Defence Force with two new amphibious ships capable of performing a range of tasks, including non-military tasks such as regional disaster relief, delivering humanitarian aid, support for peace operations, and assistance to policing or military operations. A large sealift ship will also be purchased bringing the number of hulls that can transport Australian Army elements overseas to three.

"Defence has conducted a preliminary design assessment in consultation with the Australian shipbuilding industry which confirmed the basic designs of Armaris and IZAR broadly meet the ADF's capability requirements for the new amphibious ships," Senator Hill said.

"The study will assist Defence to further assess the suitability of the companies' amphibious ship designs for the ADF's capability requirements, including the capability, cost, schedule, technical risk and industry issues relating to the construction of amphibious ships in Australia."

As part of the study, Armaris will be asked to provide detailed information relating to three variants of its Mistral design: the military off-the-shelf design which is currently in production; a modified design providing for increased troop capacity; and an option based on the original extended Mistral design.

IZAR will be asked to provide detailed information relating to its Strategic Projection Ship design.

The decision to conduct the risk reduction and design study is consistent with the Government's implementation of the Kinnaird Review's recommendation that increased planning and analysis be undertaken during the early stages of Defence projects.

Senator Hill said Defence was expected to receive the information in December 2004.

It is anticipated that the outcomes of the study will inform the selection of a preferred designer for the amphibious ships in the first half of next year.

It is hoped that the study will silence the many sensationalist and uniformed members of the media and self-proclaimed academics who have criticised and questioned the new capability requirement. Although facts have never stopped a 'good story'.

AEGIS for RAN's new destroyers

The Howard Government has selected the US Aegis air warfare system as the core of the combat system for Australia's new air warfare destroyers.

The Aegis system is currently the world's pre-eminent maritime air warfare system and forms the backbone of the USN's fleet.

Aegis is currently in-service with the Japanese and Spanish navies and soon to be introduced into the South Korean and Norwegian fleets. Aegis is capable of detecting and defeating numerous hostile aircraft and missiles simultaneously at ranges in excess of 250 kilometres.

"This combat system will be a quantum leap in the air warfare capabilities of the Royal Australian Navy. It will provide significantly increased protection from air attack for troops being transported and deployed, long-range area air warfare defence for a Navy task group and a coordinated air picture for the more effective deployment of fighter and surveillance aircraft" said Minister for Defence Senator Hill

The first of Australia's three new air warfare destroyers are expected to be delivered in 2013. The new ships, including the Aegis combat system, will be constructed at a cost of $4.5 – $6 billion.

Defence recommended Aegis as the best system for its air warfare combat needs based on cost, capability, risk reduction and schedule following analysis by the Defence Science Technology Organization and support from the USN.

Defence is currently undertaking a combat system integration and risk reduction study to:

- Refine detailed aspects of the version of the Aegis system to be acquired;
- Explore the use of Australian designed phased array fire control technology that has significant potential to enhance the air warfare destroyers' capabilities; and
- Examine options for integrating Australian components and sub-systems into the Aegis combat system.

SM-2 for FFGs

Four of the RAN's Adelaide Class Guided Missile Frigates will be capable of firing the US SM-2 anti-air missile after the Government approved a $550 million upgrade of their area air defence missile systems.

The upgrade of HMA Ships SYDNEY, DARWIN, MELBOURNE and NEWCASTLE by early 2009 would significantly improve the air warfare capabilities of the Royal Australian Navy.

The reason behind the purchase involves the shelf life of the current principle anti-air weapon of the FFGs, the SM-1, its increasing maintenance costs, limited availability (production ceased in the late 1980s) and its inability to defeat modern ASM (Anti-Ship Missiles). The project cost will cover acquisition of live and training SM-2 rounds, integration into the FFGs and supportability requirements.

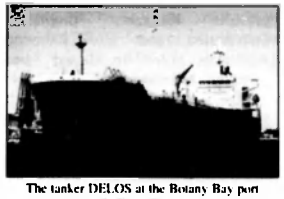
SM-2 will more than likely be used in the new air warfare destroyers and thus unused rounds from the FFGs can be altered for later use.

Tender issued for conversation of tanker

Defence has announced plans to release a request for tender (RFT) for an extensive upgrade to the recently acquired commercial tanker which will replace the Royal Australian Navy's ageing auxiliary oiler, HMAS WESTRALIA (see *THE NAVY* Vol 66 No.3 p23).

The purpose of the conversion will be to modify the vessel so that it has the latest technology and equipment capable of refuelling a range of RAN and allied Navy vessels.

The RFT is for the design, initial logistic support and modification of the *DELOS* by mid September 2004, with the successful tenderer to be contracted by the first quarter of 2005.



The tanker DELOS at the Botany Bay port facility. (RAN)

The Delos, which was purchased by Defence in June, has been leased for six months to Teekay Shipping under a standard charter contract arrangement. The lease allows Defence to generate income from the ship in the period until the modification work commences, avoiding the significant costs associated with mooring the vessel, and allowing the testing of the vessel's engineering systems at an early stage.

DELOS is 176 metres long and weighs 37,000 tonnes.

Some of the specific modifications sought include:

- The installation of a replenishment at sea rig and flight deck for daylight operations;
- Various habitability and accommodation modifications including hotel services (heating, ventilation, air-conditioning, freshwater, sewerage) for Navy personnel;
- A number of navalisation packages (including the introduction of the Rigid Hulled Inflatable Boats and a related crane, and Navy life saving and damage control modifications).

The modifications to the ship are expected to cost between $50 and $70 million and will be undertaken in Australia creating new jobs and consolidating the high-tech and specialised skills of Australia's naval shipbuilding and repair sector.

In order to meet RAN operational requirements in the 2006-07 period, Defence intends to let a single request for tender (RFT) to competitively contract for the design, initial logistic support, and modification of the ship. The successful tenderer for the prime contract will be sought from the members of the existing Navy Repair and Refit Panel, being ADI, Forgacs, United Kilpatrick Green and Tenix. It is expected that some of these companies may team with design and logistic support experts in responding to the tender.

It is expected that tendering a single contract for the design, initial logistic support, and modification of the ship will result in the vessel replacing WESTRALIA six months earlier than anticipated and also generate administrative savings.

New radar detectors for Armidales

A $25 million Australian-designed radar identification system will be installed in Australia's new Armidale class patrol boats – dramatically boosting the Navy's capability to track down illegal vessels.

The first Armidale class patrol boat nearing completion. (RAN)

Adelaide-based BAE Systems will be contracted to provide PRISM III radar identification systems for the 12 new patrol boats. It is expected that BAE will also be subcontracted to provide through-life support for 15 years by the patrol boat prime contractor, Defence Maritime Systems.

This Australian designed and developed radar identification system is expected to provide an increase in surveillance capability and better protection for Australia's coastline.

PRISM III is a passive electronic system that can detect microwave frequencies, such as those used by marine radars, and identify the type of radar being used. In combination with other sensors, this system will help the Navy to identify who is in Australian waters and increase the ability to track down illegal vessels.

Defence selected the PRISM III after evaluating available systems worldwide. The PRISM III system is already fitted to the Navy's Mine Hunters and has proved both effective and reliable.

Abrams OK for RAN

The RAN has recently modified and strengthened the stern loading ramp aboard one of its LPAs to allow the Australian Army's new 63 tonne M-1A1 AIM (D) MBT (Main Battle Tank) to self load and off load. Modifications to the second will start soon.

The Australian Army will take delivery of its first M-1A1 in 2007. Both LPAs and the LSH HMAS TOBRUK can load and unload the M-1A1 using their 70 tonne derrick however, this will most likely be while against a wharf as sea state is a limiting factor (anything higher then sea state 1 and the 63 tonne tank becomes a swinging wrecking ball by the side of the ship).

Modifications to the stern ramps will allow the Balikpapan class LCHs to marry up with the LPAs and TOBRUK to transfer the MBT to it for transport to the shore.

TOBRUK can accommodate 18 M-1A1s on her tank deck while the LPAs can each embark 21 M-1A1.

RIMPAC 2004 a success

This year's multinational maritime warfare exercise, RIMPAC, ended after 4 weeks of intensive warfare training in Hawaiian waters between seven nations; Australia, Canada, Chile, Japan, Republic of Korea, United States and United Kingdom.

One of the challenges and highlights of this year's exercise was achieving integration and interoperability with

Confirmation that the two Dutch air defence ships DE RYTUR (left) and TROMP (right) are no longer on the second hand ship market. The images show the ships being broken up for scrap. Both ships had a very impressive anti-air suite in the form of sea sparrow and SM-1 SAMs backed up by a very large 3D radar mounted on top of the bridge and under a protective dome which looked like a large balloon. When decommissioned there were rumours that Indonesia was keen to purchase them.

other nations. Royal Australian Navy, Army and Air Force units were fully integrated into multinational forces for exercise warfare scenarios, aiming for efficiency in working as a coalition force. Australian Navy and Air Force personnel, working in key positions in foreign ships, succeeded in improving communication between units.

The RAN's Commodore Davyd Thomas was Deputy Commander of the Combined Task Force and second in command of the exercise.

"Exercise RIMPAC 04 was valuable training for operating in a coalition situation. Our personnel have overcome communication and system differences and shared their skills and expertise with our friends and allies," Commodore Thomas said.

"We came here to improve our readiness and efficiency in operating as a coalition force and we have done exactly that. We have also made some good friends along the way".

Exercise Rim of the Pacific 2004 (RIMPAC) aimed to improve war-fighting skills of participating units in a range of combined operations at sea. By enhancing interoperability, RIMPAC helps promote stability in the Pacific Rim region. This year's exercise included a variety of surface combatant ships, submarines, aircraft, and amphibious forces. It was the 19th in a series of RIMPAC exercises conducted periodically since 1971. RIMPAC 04 involved 40 ships, 7 submarines, 90 aircraft and 17,000 sailors, airmen, marines, soldiers and coast guards personnel.

The Australian Defence Force contribution included elements from each of the services.

The RAN's HMA Ships NEWCASTLE, PARRAMATTA, replenishment ship HMAS SUCCESS, the Collins class submarine HMAS RANKIN and RAAF P-3 Orion aircraft conducted warfare exercises with over 35 other ships.

The Army's C Company 2 RAR embarked in the USS TARAWA and conducted amphibious operations with the United States Marine Corps. The Australian Navy's Clearance Diving Team One also operated with the US Marine Corps from the US High Speed Vessel SWIFT.

Royal Australian Air Force Hercules and B707 aircraft provided logistics support.

Australian Defence Force personnel from Maritime Command, Air Command and Deployable Joint Forces were also fully integrated into the combined headquarters in Hawaii. Specialist Royal Australian Navy and Royal Australian Air Force personnel embarked in the aircraft carrier USS JOHN C STENNIS, multi-purpose amphibious ship USS TARAWA, Austin Class amphibious transport dock USS DUBUQUE and the Canadian air defence destroyer HMCS ALGONQUIN. In total, more than 1100 Australian Defence Force personnel took part in the exercise.

Collins troubles at an end

Defence Minister Robert Hill and Finance Minister Nick Minchin have settled all outstanding commercial issues relating to the Collins Class submarines between the Department of Defence, Australian Submarine Corporation and Kockums AB of Sweden.

The key features of the settlement are:

- Defence and ASC have full access to Kockums' intellectual property for maintaining, supporting and upgrading the Collins Class submarines throughout the life of the Class.
- Formal termination of the various contracts between the parties for the design and construction of the submarines, and subsequent settlement of all claims arising from these contracts.
- Provision of a contract under which Defence and ASC may have access to Kockums' design services for support of the Collins Class submarines as required.

The settlement provides full access for Defence, ASC and their subcontractors to Kockums' intellectual property for the Collins Class submarines within a framework that protects Kockums' proprietary information and also facilitates Australian access to United States submarine technology.

The settlement marks the end of long and complex negotiations between Defence, ASC and Kockums, and the subsequent beginning of a new era for ASC as the company strengthens its role as designer and provider of through-life support of the Collins Class submarines.

All future work by ASC in maintaining, supporting and upgrading the submarines will be carried out through a long term strategic relationship with Defence under the $3.5 billion Through-Life Support Contract signed in December last year.

The Ministers noted that the settlement with Kockums brings to an end the ongoing legal negotiations and proceedings and expressed their appreciation to Kockums for their assistance in resolving these issues.

737 replaces Orion

The U.S. Navy has awarded a Boeing-led industry team a US$3.89 billion contract to build the Multi-mission Maritime Aircraft (MMA). The total program acquisition value is estimated at about US$20 billion for 108 aircraft.

The Boeing-led team, which includes CFM International, Northrop Grumman, Raytheon and Smiths Aerospace will produce seven test aircraft during the program's System Development and Demonstration (SDD) phase. Plans call for up to 108 aircraft to be purchased by the US Navy to replace its aging fleet of 223 P-3 Orion aircraft.

"The 737 MMA will play a critical role in the future of maritime warfare by providing the U.S. with dominance in anti-submarine and anti-surface warfare as well as reconnaissance and surveillance missions," said Jim Albaugh, president and Chief Executive Officer of Boeing Integrated Defense Systems.

The CFM56-7 engines that will power the Boeing 737 MMA are produced by CFM International, a 50/50 joint company of Snecma Moteurs and General Electric Company. This is the same engine that powers the RAAF's Boeing 737 Airborne Early Warning & Control aircraft, as well as the U.S. Navy's C-40 transport aircraft. The two CFM56-7B27A engines will each provide 27,300 pounds of takeoff thrust and support MMA's demanding electrical output requirements to support flight deck and mission system operations. The CFM56-7 is one of the world's most reliable engines. More than 3,000 units have been delivered to date. This fleet of engines has logged more than 30 million flight hours while maintaining an industry-leading .002 in-flight shut down rate per 1,000 flight hours. This rate translates to one event every 500,000 flight hours.

Northrop Grumman's Baltimore-based Electronic Systems sector will provide the electro-optical/infrared (EO/IR) sensor, the directional infrared countermeasures system, and the electronic support measures system. Northrop Grumman's Mission Systems sector, based in Reston, Va., will develop data links for MMA. The company's Integrated Systems sector, based in El Segundo, Calif., will support the mission planning effort.

A computer generated image of the new Boeing 737 MMA which 108 will be built for the USN. (Boeing)

Raytheon will provide an upgraded APS-137 Maritime Surveillance Radar and Signals Intelligence (SIGINT) solutions. Raytheon is also offering its revolutionary GPS Anti-Jam, Integrated Friend or Foe, and Towed Decoy Self-Protection Suites, and the aircraft's Broadcast Info System (BIS) and secure UHF Satcom capability.

Smiths Aerospace supplies both the Flight Management and Stores Management systems on the Boeing 737 MMA. The Flight Management System provides a truly integrated open architecture that is CNS/ATM compliant along with an inherent growth path for upgrades. The Stores Management System provides a comprehensive system for the electronic control of integrated weapons management. This system is designed with standards to accommodate current and future precision weapons.

Steel Cat slinks to sunny Qld

The sinking of the former HMAS BRISBANE, *The Steel Cat*, off the Queensland coast next year will create a "dive magnet" for Australia, bringing 25,000 extra tourists to the region and providing up to 200 new jobs, Queensland Premier Peter Beattie said at the formal hand over of the ship in Sydney.

Premier Beattie, the Federal Member for Fisher, Peter Slipper, who pushed hard for BRISBANE to go to Queensland, and the State member for the seat of Kawana, Chris Cummins, were on hand at Fleet Base East on July 13 to accept the destroyer from the Defence Minister, Senator Robert Hill.

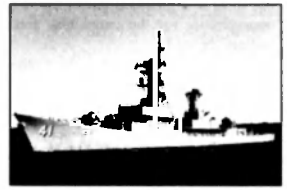
A number of serving and former members of her ship's company, including the present Maritime Commander, RADM Rowan Moffitt, were also present.

Six Chiefs of Navy served on her.

Next year, after extensive environmental checks, BRISBANE will be sunk 28 metres deep, 2.9 kilometres east of the Sunshine Coast's Mudjimba Island.

Scuttling teams hope she will settle upright, as have sister ships PERTH in Western Australia and HOBART off South Australia, on the sandy seabed.

The site is well clear of fishing and trawling grounds and one that complies with the Queensland Environmental Protection Agency rules. The ship will also become a fish habitat.



The former HMAS BRISBANE leaving Sydney for the last time. Her bridge has been removed and is currently at the Australian War Memorial's Mitchell annex undergoing conservation for future exhibition. (Chris Sattler, Warships & Marine Corps Museum, Franklin, Tasmania)

In farewelling the ship Senator Hill said: "It is sad ... but she has served well. She went to Vietnam twice and to the first Gulf War. Many thousands served in her."

He also thanked Queensland for taking her. "Today is tinged with sadness. A sad farewell. She is a great piece of naval heritage," the Minister said.

Premier Beattie said he was quite excited about Queensland getting the ship.

"The ship is coming home," he said. "She will bring an extra 25,000 tourists to the region and create up to 200 jobs. She will be a 'dive magnet' for Australia, attracting not only Australian but international divers," he said.

By Graham Davis

RANKIN proves formidable

The US Navy has described HMAS RANKIN as "a formidable opponent" after her performance in the last major training exercise before the start of RIMPAC.

RANKIN (LCDR Steve Hussey) was the centrepiece of Exercise Silent Fury as a "hostile" submarine, pitted against a highly capable US Navy ASW task group.

The US guided missile destroyers USS O'KANE and USS PAUL HAMILTON, guided missile frigate USS REUBEN JAMES, nuclear submarine USS KEY WEST, six P-3C Orions and Helicopter Anti-Submarine Squadron Light 37 united themselves against the Australian "Black Knight".

"Silent Fury was an excellent opportunity for us to challenge our air crews in our primary mission area of undersea warfare," said CMDR David Smith, Commanding Officer of the US Patrol Squadron 4.

"RANKIN was a formidable opponent and provided unique training opportunities for the entire task force and us," he said.

The US recognise that the Collins class diesel submarines are superb at exceptionally silent underwater operations.

USS TICONDEROGA decommissions

The USN's guided-missile cruiser USS TICONDEROGA (CG-47) was decommissioned on Sept. 30 2004.

More than twenty years old, TICONDEROGA was built in Pascagoula, commissioned in January 1983, and was the first ship of the AEGIS guided-missile cruiser class. It was the world's first surface combatant equipped with the AEGIS combat system, the most sophisticated air defence in the world. During the ship's lifetime, its crews have been involved in major national and international events, and several historic NATO exercises. TICONDEROGA's adventures have taken her to duty in the Gulf of Sidra, off the coast of Beirut, to the Arctic Circle, the Equator, and through the Suez and Panama canals. The ship was one of the first to report on station in support of Operation Desert Shield/Desert Storm in 1990. She has deployed to the Mediterranean Sea, the Caribbean Sea and the Eastern Pacific Ocean.

The USN's guided-missile cruiser USS TICONDEROGA (CG-47) was decommissioned on Sept. 30 2004

The current TICONDEROGA is the fifth U.S. Navy ship to bear the historic name. She is named in commemoration of the capture of Fort Ticonderoga on Lake Champlain in eastern New York, in May 1775, by Ethan Allen and his Green Mountain Boys'. One of the first military successes of the American Revolution, the seizure provided desperately needed cannons and supplies to George Washington's army.

Maritime Chinook on drawing board

It was announced at this year's Farnbourgh air show that the UK MoD is set to launch a £100 million project to produce a specialized maritime version of the very successful Boeing CH-47 Chinook later this year.

According to Boeing executives, the UK MoD is proposing to develop a version of the heavy lift helicopter optimised for shipboard operation, including automatic folding rotor blades, extra marinisation of engine components, radios, navigation equipment and other enhancements.

One enhancement on the drawing board involves shortening of the blades so they do not bend too much when idle in high seas, thus making it difficult to start up when the up and down motion of the ship could produce stress on the blades and prevent start up due to proximity to the helicopter's fuselage.

The UK Royal Air Force currently has 38 CH-47s in service.

First F-310 frigate for Norway

Spanish firm IZAR recently launched the FRIDTJOF NANSEN, the first of a series of five F-310 class frigates for the Royal Norwegian Navy. The order for the five ships was placed in June 2000.

This ship will be fitted out and delivered fully operational in September 2005 and was launched 70% complete, a high percentage for the first ship of a series. This was possible due to the integrated modular construction system used in the Shipyard.

The keel laying of the second unit, ROALD AMUNDSEN, took place immediately after the launching of the first ship. ROALD AMUNDSEN's launching is expected in April 2005.

The Royal Norwegian Navy's first F-310 frigate, FRIDTJOF NANSEN, being launched. On launching the ship was nearly 70% complete (IZAR)

The F-310 class is one of the most advanced frigates in the world. It is the first unit of this size to incorporate the Lockheed Martin SPY-1F radar. The SPY-1F multifunction radar is a smaller version of the Lockheed Martin AN/SPY-1D, the world's most advanced system for anti-air warfare and anti-missile defence.

F-310 Characteristics:
Length 133.25 m
Beam 16.80 m
Full Load Displacement 5,130 t
Design Draught 4.90 m
Complement 146 people

Technical Information:
The FRIDTJOF NANSEN frigate is provided with specific measures intended to improve her survivability. Some of these measures are:

- Reduction of Radar Cross Section (RCS),
- Reduction of Infrared Signature,
- Reduction of Underwater Radiated Noise,
- NBC Protection,
- Shock Resistance against underwater explosion,
- Vital Spaces Ballistic Protection,
- RnoN's Stability Criteria, with-standing damages of up to 15% of the ship's length, and,
- Four dedicated Damage Control areas.

The propulsion plant is CODAG type and includes a gas turbine, two propulsion diesel engines, a set of reduction gears and two shaft lines, each driving a controllable pitch propeller.

The F-310 is fitted with a retractable bow thruster intended to improve manoeuvrability in shallow waters but which can also be used as an auxiliary propulsion unit.

The electric plant consists of four 1,100 kW diesel generator sets located in the aft diesel generator room (two sets) and in the forward main engine room (two sets). The plant also includes two main switchboards.

SA Navy on track

Progress in developing South Africa's naval forces took a leap forward recently with the first of three submarines launched and her fourth and final corvette named.

The submarines, together with Gripen fighter aircraft and Hawk trainer jets on order, are the fruits of South Africa's controversial multibillion-Rand arms deal.

Submarine S101 was launched at a ceremony at the shipyard of the lead member of the German Submarine Consortium, HDW, in Kiel, Germany.

The Navy's fourth Meko A-200 corvette was named SAS MENDI, after the troop ship the SS MENDI that sank while crossing the English Channel to France in 1917 during the First World War.

The first submarine must still undergo harbour and sea trials, with delivery to SA expected in July next year.

Since the navy's third Daphne class submarine was decommissioned last year, SA has had no underwater fighting capability.

The new 209 class submarines are the most widely used conventional class in the world, as advanced as those in use by the German Navy.

Third Indian Krivak arrives

The Indian Navy has received the third Russian-made Krivak-class stealth warship, INS TABAR, in Mumbai during August.

The warship should have arrived earlier in the year, but was delayed due to recurring problems with its Shtil SAM system. The Indian Navy refused to take delivery of the ship from Russia until the problem was resolved.

It was launched at St Petersburg in Russia in May 2001.

Enroute to Mumbai, INS TABAR, visited ports in South America and South Africa covering a total distance of 18,000 nautical miles.

Indian defence experts have welcomed the arrival of these warships as they believe they will provide the Indian Navy an edge over its rivals.

INS TABAR has a top speed of 30 knots and when fully loaded has a displacement of 3,850 tonnes. Its weapon suite includes the vertically launched Klub-N ASM and the Shtil SAM system.

Defence sources do not rule out the possibility of all the three Russian- made warships being equipped with the Brahmos supersonic missile, which is an Indo-Russian project based on the SS-N-26.

The $1 billion contract for acquiring the three stealth warships was signed between India and Russia in 1997.

US destroyers keeping tabs on Pyongyang

Defence contractor Lockheed Martin is modifying six US Navy destroyers for use in the Sea of Japan to provide early warning of North Korean nuclear missiles fired at the US.

The modifications to radar and computer signal processors on the Aegis-class destroyers in the waters separating Japan and the Korean peninsula will allow detection and tracking of medium- and long-range missiles, said a Lockheed spokesman.

Tracking information will be converted into targeting information for interceptor missiles. The one-ship patrols have started and will continue on a rotating basis.

"Having them way up forward means you can track the target longer and the more information you have, the better if you have to take a shot," the spokesman said.

The US Navy confirmed in a statement that a destroyer for tracking missiles will be deployed to the Sea of Japan as of September and on a virtually continuous basis thereafter.

Earlier, Air Force Lieutenant-General Ronald Kadish, then head of the Defence Department's Missile Defence Agency, said in an interview that North Korea had 'significantly' improved the capability of its long-range missiles.

And the Central Intelligence Agency has said in public testimony that a Taepodong-2 missile could carry a nuclear payload to Alaska, Hawaii and parts of the continental US.

Singapore, Malaysia, Indonesia start Pirate patrols

Singapore, Indonesia and Malaysia have begun coordinated patrols of the vital Straits of Malacca shipping lane to deter terrorism and piracy in East Asia's maritime lifeline.

Admiral Anwar Mohd Nor, Malaysia's Chief of Navy, said: "If there is an incident where a "hot" pursue occurs, we will establish communication and will conduct a handing-over kind of operation, rather than pursuing the contact."

Lieutenant-General Ng Yat Chung, Singapore's Chief of Defence Force, said: "For us in the Singapore Armed Forces, we are prepared to commit at any one time, five to seven ships all year round to contribute to this trilateral coordinated patrol."

A hotline has also been set up to allow victims of the pirates to call for help.

The narrow strait between Malaysia and Indonesia, with Singapore at the southern entrance carries a third of world trade and almost all oil imports to Japan and China.

And the three nations say they welcome help from interested parties.

General Endriartono Sutarto, Indonesia's Chief of Defence Force, said: "The assistance could be support in equipment, skills and also if they want to join, it should be approved first by the three countries."

Piracy has plagued the waterway for centuries, but has worsened in recent years and since the September 11 attacks on the United States in 2001, the prospect of terrorist strikes has emerged.

Security experts and government ministers have warned that terrorists could attack merchant vessels to hinder the flow of global trade, or use a tanker as a floating bomb to devastate one of the region's busy ports.

The security of the straits was put firmly on the political agenda in March, when Admiral Thomas Fargo, commander of US forces in the Pacific, said a US plan to heighten security there might involve US elite troops who could "take action when the decision has been made to do so".

Malaysia and Indonesia rejected the US plan, saying that foreign troops weren't needed to help safeguard the waterway and that any active US deployment would infringe on their sovereignty.

As a result, the littoral states have taken action to increase activities, with the coordinated patrols a key step.

But naval vessels could not stray into territorial waters of a neighbouring country if chasing a craft, but would radio information to their counterparts.

Security experts say this could represent a weak link.

To overcome the issue of sovereignty, regional naval chiefs agreed to create a task force made up of navies from each nation operating under their national commands.

First images of the Australian Army's new watercraft to replace its LCM 8. Ordered before the Army decided on a new heavy main battle tank it is unsure if the new craft can take the 63 tonne weight of the M-1A1 tank. (Brian Morrison, Warships & Marine Corps Museum Int, Franklin, Tas)

Fincantieri launches CONTE DE CAVOUR

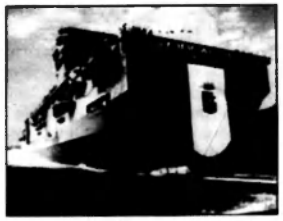
The new Italian aircraft carrier, CONTE DE CAVOUR, which was ordered by the Italian Navy in November 2000, was recently launched at shipbuilder Fincantieri's Genoa yard.

The ship has a displacement at full load of 27,100 tonnes; an overall length of 244 metres; a maximum beam of 39 metres; a draught of 8.7 metres and a sustained speed of 28 knots; will have a range of 7,000 nautical miles at 16 knots, equivalent to approximately 18 days sailing, which will enable her to carry out long range operations.

The four General Electric-Avio turbines of the CONTE DE CAVOUR generate 88,000 kW. Making them the most powerful non-nuclear plant to be built in the world in recent decades.

The CONTE DE CAVOUR can accommodate up to 1,210 people – ship's complement (451), aircrew (203), amphibious command task force (140), and San Marco Battalion (325), with space for an extra 91 troops if required.

The aircraft carrier, which Fincantieri started building in summer 2001 for delivery in 2007, will mainly carry out air operations; her hangar will also be able to accommodate land vehicles and will be equipped with access ramps for wheeled and tracked vehicles, both for military and civilian missions. The vessel will also be able to embark the full range of aircraft types used by the Italian Navy: helicopters (EH-101, NH-90 and SH-3D) and fixed wing aircraft (Harrier AV-8B II+ and, in the future, F-35 Joint Strike Fighters).



The new Italian aircraft carrier CONTE DE CAVOUR being launched at shipbuilder Fincantieri's Genoa yard. (Fincantieri)

In building the vessel Fincantieri drew greatly on its experience in merchant shipbuilding where the company is a world leader in the field of cruise ships and large ferries. Transfer of dual knowledge and expertise gained both in the naval and in the merchant field leads to important synergies and is considered one of the company's pillars of strength.

Indonesia commissions patrol boats

The Indonesian Navy has received three new patrol boats produced by its maintenance facility unit at a ceremony aboard one of them in the waters off Jakarta on August 6.

The three patrol boats – KRI BOA 807, KRI WELANG 808 and KRI TALIWANGSA 870 – measure 36 metres and weigh 90 tons each with a maximum speed of 28 knots, each priced at 12 billion rupiah (US$1.3 million).

On the occasion, Indonesian Navy Chief of Staff Admiral Bernard Kent Sondakh said he expected 12 patrol boats of similar type to be in service by the end of this year.

He also said the first 40-metre patrol boat project by the Navy was expected to be completed this year and be fitted with guided missiles that will also be produced by local industries.

He said he would invite institutions concerned to jointly produce Indonesia's first indigenously made guided missiles. They include the Indonesian Institute of Sciences, state arms industry Pindad and state-run aerospace industry PT Dirgantara Indonesia.

SM-6 inbound

The US Office of the Secretary for Defense has given approval for the USN to begin the system development and demonstration phase of the navy's planned SM-6 anti-aircraft missile system.

The SM-6 is an extended range active anti-air missile intended for over the horizon autonomous engagements of aircraft and missiles. Preliminary estimates put the fire and forget missile's range against air threats at 200nm.

The missile will look essentially the same as the SM-3 missile with its large booster rocket and have mid-course update guidance and the seeker head of the AIM-120 AMRAAM (Advanced Medium Range Air-Air Missile).

The missile will be vertically launched and adopt a high altitude ballistic trajectory to the target area. Once at its apogee the SM-6 will dive down onto its target using its own onboard target search and designation system for target acquisition and course corrections. Future Block upgrades to the SM-6 may include an IR backup to aid against stealth aircraft or in high electronic jamming environments.

The USN will now produce 120 low-rate initial production missiles before a review is carried out to ascertain if the missile and technology is ready for full-rate production.

Observations

By Geoffrey Evans

SHIPPING AND PORT VULNERABILITY

The shipping world received unexpected media attention mid-year as the Government announced various measures to counter possible terrorist attacks on the country via the waterfront.

International shipping authorities in fact recognised the potential risks to ships and ports following the attacks in New York and Washington in September 2001: The International Maritime Organisation (IMO) proposed a number of maritime security measures that were adopted at a Conference in December 2002 and due to be in force by 1 July 2004; a high rate off compliance by countries has been reported, including Australia, but there is a long way to go and it will be very costly if all proposed measures are to be implemented.

The shipping and cargo handling industry is huge. In a highly detailed paper on maritime related terrorism released at the beginning of the year, Michael Richardson, Visiting Senior Research Fellow at the Institute of Southeast Studies in Singapore, notes that at least 46,000 ships ply the oceans, calling at over 2,800 ports; in 2002 these ships moved some 5.9 billion tonnes of materials of which general cargo (i.e. non-bulk) was mostly in containers of which there are an estimated 15 million in circulation. 1.2 million seafarers are employed while hundreds of thousands work in the ports.

Australian shipping figures are equally impressive. In 2002-2003, 593.9 million tons of materials were moved into and out of the country; 8,866 ship arrivals from overseas were recorded, 3.9 million containers were exchanged in the five mainland capital ports, 2.75 million in Melbourne and Sydney alone (and of which, realistically, only a fraction could be inspected). With only 50 or so Australian-flagged ships available most of the cargoes were transported in overseas owned vessels, including those on so-called 'FLAG of convenience' registers that may well spend some time in Australian waters.

The IMO sponsored security measures require universal adoption of precautions already taken by most responsible shipowners and shipmasters, e.g., restricted access to ships, supervision of cargo etc. An important new requirement concerns crew identification – passports will have to be carried by all seafarers and before a foreign ship enters Australian waters a crew list will be required by immigration authorities (a difficulty would seem to be the physical effort needed to identify hundreds of individuals). Other steps in train include the provision of sophisticated container inspection equipment, more inspections and random boarding of ships on first arrival by Customs Service officers. Port security measures will include identification cards for port workers, an extension of the existing closed-circuit television network to all 63 Customs proclaimed ports and increased intelligence collection facilities.

Leaving aside the arduous task of checking ships, their cargoes and crews, and increasing port security, a great deal of Australia's seaborne trade passes through restricted waters such as the Malacca and Singapore Straits, the Strait of Hormuz and the Suez and Panama Canals; all are vulnerable to attack by terrorists or, in the case of SE Asia straits, by pirates who have been active for several years. Fortunately Australia's principal trading partners are well aware of the existing and potential dangers they face at sea and in the ports and are working closely together to reduce the risks.

(Figures by courtesy of the Bureau of Transport and Regional Economic.)

DEFENCE AND THE ELECTIONS

It is probably inevitable, but in the lead-up to Federal elections Government Ministers promise new initiatives and Opposition spokespeople forecast drastic changes in the Departments over which they hope to preside.

Scepticism usually greets the Ministerial pronouncements – why didn't you do this while in Office? – and it would seem sensible for Opposition Ministerial hopefuls to wait until they were in office before making rash promises to make changes that may well prove unnecessary or impracticable; especially in Defence, one of the most complex organisations in the country.

In fact, over the years changes brought about by elections have made little difference to Australia's defence arrangements; rather the Organisation has evolved as a result of events in the wider world, a pattern of development for which Australians should be grateful.

COASTWATCH

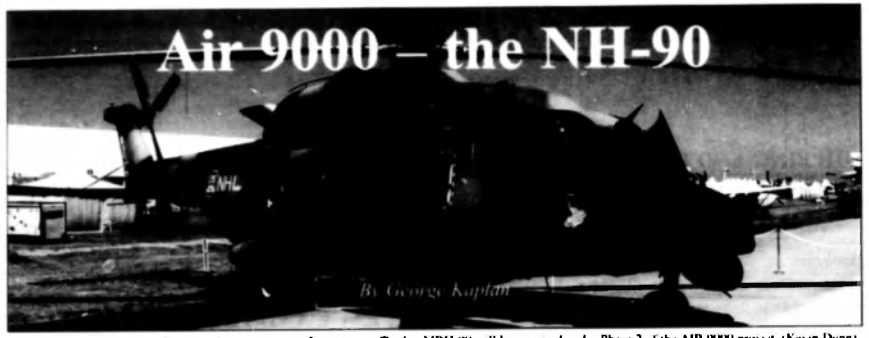
Bearing in mind the numerous reviews and changes in Australia's coastal surveillance arrangements between the late nineteen-sixties and the end of the century, after 4 or 5 years of relative stability under Customs Service administration, Coastwatch seems destined for a further period of change in the event of a change of government.

The name would almost certainly change from Coastwatch to Coastguard or Coast Guard (as in America) but it is not clear if the Organisation would become the responsibility of a new department or be transferred to the Federal Police, which became the co-ordinating authority in 1984, taking over from the Department of Transport. New equipment including patrol boats able to operate helicopters have also been proposed; the latter would not be cheap but would at least relieve the Navy of the need to provide even-more-expensive frigates for some tasks.

An important change was made to surveillance arrangements in 1999 when a senior naval officer(*) was seconded to the Customs Service as Director General of Coastwatch and co-ordinator of the several government departments and agencies involved. In a relatively short time the Director General with a tiny staff and the administrative support of Customs brought the various elements together and with more effectively used resources formed an Organisation that has served Australia well over the past several years. Change for the sake of change is to be avoided.

*Rear Admiral R E Shalders, since promoted and currently serving as Vice Chief of the Defence Force.

Air 9000 – the NH-90



A mock up of the MRH-90 in Australian Army camouflage pattern. Twelve MRH-90 will be acquired under Phase 2 of the AIR 9000 project. (Kevin Dunn)

In a decision applauded by many observers, the ADF has finally chosen its additional amphibious troop lift helicopter, first announced in the last White Paper. The NH-90, now known as the NRH-90 in the Australian context, is set to replace two types of Army helicopter and two types of Navy helicopters with the one airframe. This consolidation will save money in logistics, training and provide a significant capability boost to the ADF's ability for helicopter operations.

On the 31st of August 2004, the Australian Government announced that a derivative of the NH Industries NH-90 multi role helicopter had been selected to outfit a new squadron of troop lift helicopters for the Australian Army.

The 12 MRH-90 helicopters in this order represent more than just a reinforcement of the Army's troop lift capability; they represent a new direction for the Australian Defence Force's (ADF) medium helicopter operations for the next twenty years, with major implications for the future ADF helicopter fleet.

Navy will require replacements for the Sea King and Seahawk helicopters, and economies of scale and interoperability suggest that any additional Army troop lift helicopter requirements will almost automatically be fulfilled by additional NH-90 derivatives.

So what lies behind this momentous decision, how was the decision arrived at and what does the NH-90 offer to the ADF?

Background to the decision

The ADF has been an enthusiastic operator of Sikorsky's UH-60 derived Black Hawk and Seahawk helicopters, with the first helicopters delivered in the 1980's.

In that time the aircraft have seen service throughout Australia, and in climates as varied as the frigid Great Southern Ocean, the steamy jungles of East Timor, the Solomons & Bougainville and the desert environment of the Persian Gulf.

Despite their excellent service record, there have been a number of limitations on the operations of the aircraft, in particular Army's Black Hawks.

Deployments on board the Navy's amphibious ships have highlighted the Black Hawk's lack of marinisation features, such as the ability to operate in the harsh and corrosive salt air environment on board ship. In addition, the limitations of the rotor and rotor head mean that folding mechanisms on the Black Hawk are non-existent and thus impose a substantial strain on the operations of the aircraft on board the Navy's amphibious ships, MANOORA and KANIMBLA. To store the helicopters in the hangers of the LPAs two of the four rotor blades have to be removed and then re-fitted when the aircraft are required to fly. This takes time and is potentially damaging to the aircraft's safe operation. One would not take the wings off a fixed wing aircraft each time it was to be hangered due to the stress imposed on the connections.

More recent operations in support of the "War on Terror", which have seen operations in Afghanistan and Iraq, have highlighted the need to increase the number of troops being lifted in each helicopter. The Black Hawk is capable of lifting a maximum of 11 fully equipped troops and this is believed to be too few.

Army analysis of these operations has highlighted the "shock value" of delivering the maximum number of troops into the operational area in the shortest amount of time. In US operations this has seen the heavy use of the Marines CH-53 Super Stallion and the US Army's CH-47 Chinook helicopters in the troop assault role, delivering the maximum number of troops and equipment in the fewest lifts. The CH-47 Chinook has been the work horse of operations in Afghanistan and are now quite difficult to come by given the demand particularly by the US for CH-47s.

Whist the Australian Army operates the CH-47 Chinook, numbers are limited and the Chinook's heavy lift capability is prized for the deployment of vehicles, artillery pieces, fuel bladders and similar outsize loads. However, during Australia's commitment to the war in Iraq it deployed three of its six Chinooks given their range, payload, serviceability and durability to support SAS and 4 RAR Special Forces operations.

The UH-60 from which both the Black Hawk and Seahawk were developed began life as a replacement for the ubiquitous UH-1 Iroquois in US Army service. It was seen as a "battle taxi" for the European theatre of operations.

Reflecting the experience of the US military in Vietnam, the Black Hawk is a product of late 1970's / early 1980's design, suitably updated with new technology through a series of rolling upgrades to keep it in front line service.

Despite these upgrades however, the platform itself is still essentially a quarter-century old design and is starting to show its age. An indication of the Black Hawk's growing age is the fact the US Army is not upgrading them to the latest version, instead, it is looking for a larger helicopter with a rear loading ramp such as the NH-90.

Recognising these limitations the Australian Army initiated a competition for additional battlefield troop lift helicopters as part of a far-reaching ADF plan to rationalise the number of different helicopters in ADF service under the project name AIR 9000.

The Contenders

The ADF received a number of submissions from helicopter manufacturers around the world including the EH-101 Merlin, Sikorsky's H-92 Superhawk, upgraded Black Hawks, the Eurocopter Cougar and the NH-90. During the selection process the contenders were eliminated one by one until the final decision rested between NH Industries and Sikorsky's offerings.

Sikorsky proposed a mix of 13 new UH-60M Black Hawks and upgrading the Australian Army's existing 35 S-70A-9 Black Hawks to the M standard.

In Sikorsky's favour was the long operational experience that the ADF has with UH-60/S-70 derivatives and the worldwide operator base including the vast US Army Black Hawk and US Navy Seahawk fleets.

Sikorsky also pitched the H-92 as the natural successor to the Black Hawk, incorporating the experience of almost 30 years of Black Hawk operational service, incorporating substantial elements of the Black Hawk's engine, transmission and drive train systems.

Unfortunately for Sikorsky, they have yet to deliver the H-92 to a military customer, which was seen as a negative in the competition particularly given the successful international sales record of the competing NH-90.

The only military customer for the H-92 so far is the Canadian Navy, which ordered the H-92 in 2004 after a torturously protracted procurement contest and which will see the first delivery in 2008.

The NH-90 has been developed by a European consortium of aerospace manufacturers with NH Industries, the prime contractor for the programme, a joint venture company owned by Westland of the UK, Agusta of Italy, Fokker of the Netherlands, OGMA of Portugal and Eurocopter.

Eurocopter is a subsidiary of EADS (European Aeronautics Defence and Space) company formed by DaimlerChrysler Aerospace of Germany, Aerospatiale Matra of France and CASA of Spain.

The NH-90 has been ordered by France, Germany, Italy, Portugal, the Netherlands and in 2001 achieved its first order by a non-manufacturing country when it was chosen as the winner for the Nordic Standard Helicopter Programme for the navies of Norway, Sweden and Finland.

Sweden has ordered 18 aircraft, Finland 20 and Norway 14 NH-90 derivatives. In another close fought competition in September 2003, Greece ordered 20 NH-90 with another 14 on option, and Oman recently ordered 20 helicopters.

A mock up of the MRH-90 in Australian Army camouflage pattern and fitted with a long range fuel tank. Note that the position of the tank does not interfere with door access or machine gun employment.

An Army Black Hawk being brought out of the hangar of one of the RAN's LPA's. Notice the absence of two of the helicopter's four rotors. These have to be removed as the blades do not fold. (RAN)

With the success of the Australian competition, the total order book for NH-90 stands at 357 for 11 nations, with a further 86 aircraft on option with existing customers. The NH-90 is also a competitor in several other international competitions, once again in opposition to the UH-60 / H-92, most pertinently for the New Zealand medium helicopter competition.

Given the international success of the NH90, what are customers getting for their money?

The MRH-90

The NH Industries NH-90 is a medium helicopter offered in two different versions, the NFH-90 maritime helicopter and the NH-90 Troop Transport Helicopter (TTH), which forms the basis for the Australian Multi Role Helicopter 90 aircraft (MRH-90).

Powered by twin turbine engines, the Australian MRH-90 will lift 18 fully equipped troops plus a crew of four and can deploy them via cabin doors on both sides of the aircraft and a rear cargo ramp exiting under the tail boom. When the seats are removed many more troops can be accommodated.

The cabin provides some 12.5 cubic metres of usable space, and allows the deployment of smaller vehicles such as the SAS Regiment's four-wheel two person all terrain vehicles.

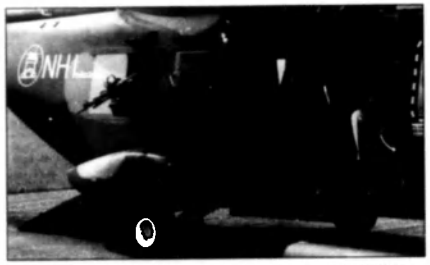
Range is over 900 kilometres with a maximum speed of 300 kilometres per hour and an underslung load of four tonnes can be carried.

The MRH-90 is air transportable by the RAAF's fleet of C-130 Hercules and strategic mobility can be achieved by deploying on board the Royal Australian Navy's current and future amphibious ships.

Four MRH-90 aircraft can be operated comfortably from each of the RAN's two Landing Platform Amphibious (LPA) HMAS MANOORA and KANIMBLA. The projected replacements for these ships envision having helicopter spots for the operation of six MRH-90 aircraft simultaneously.

To further support shipboard operations the MRH-90 can fold the rotor blades and tail rotor boom, which results in a reduction in overall length from 19.65 metres to 13.5 metres.

Unlike the Black Hawk being offered in this competition the MRH-90 is built marinised while the Black Hawk is 'marinised' after build. The former provides more protection from the harsh salt air elements found at sea.



A side view of the large door access to the main cabin of the NRH-90 helicopter. Also visible is one of the two side mounted machine guns and the rear loading ramp.

The MRH-90 is equipped with a full fly-by-wire flight control system and night vision goggle compatible digital cockpit, and is built for passenger survival in the operational environment.

The MRH-90 is fully water ditching certified and incorporates built in crashworthiness and tolerance to structural and system damage in the event of battle damage.

Taken together the MRH-90 will offer a quantum leap in capability over the ADF's current Black Hawk fleet, incorporating the most modern manufacturing and design techniques resulting in a helicopter offering a wide range of improvements in operational capability. It is also designed with radar cross-section reduction measures in the fuselage shape.

The Implications

The initial order placed is for a total of 12 MRH-90 aircraft under Phase 2 of the AIR 9000 contract with Phase 4 calling for the acquisition of another 28 MRH-90, due in to be announced in less than a year.

The initial order for 12 was announced by the Prime Minister and Defence Minister. Part of the rationale for the purchase is to allow the transfer of a dozen Black Hawk Helicopters from troop transport duties in Townsville to a specialist counter terrorist role based near Sydney.

AIR 9000's Phase 2 and 4 will provide the Army with four squadrons of highly capable marinised troop lift helicopters, suitable for embarkation on the Navy's current and future amphibious vessels.

To realise additional economies of scale it would make sense for the RAN to replace the current Seahawk / Sea King fleet with the NFH-90 and MRH-90 versions of the NH-90.

The NFH-90, the naval helicopter version of the NH-90 is a versatile maritime combat platform, capable of surveillance, anti-submarine and anti-surface roles as required. The NFH-90 would be compatible with the RAN's current FFG and ANZAC class frigates (with minor modifications required) and will be suitable for operations from the Navy's future Air Warfare Destroyer.

The RAN's Sea King is a larger helicopter than the MRH-90 (the EH-101 being the most comparable modern helicopter) however, the loss of some lift capability should be balanced against the substantial cost and operational efficiencies accruing to a unified fleet, not to mention the battle survivability, speed and range.

The Sea Kings are currently operated in amphibious, fleet support and heavy lift roles, however, a larger fleet of amphibious-capable Army MRH-90s should relieve the Sea King of the first role, the fleet support role could be carried out by Navy-operated MRH-90s and extra heavy lift operations could be undertaken by the Army's Chinooks, possibly reinforced with a purchase of several additional Chinooks (see this edition's *Flash Traffic* section for details on a marinised Chinook project by the UK MoD).

This would result in the ADF replacing four aircraft types (Black Hawk, Seahawk, Sea King & Iroquois) with essentially one common airframe (NFH-90 and MRH-90).

Additional scope exists for the replacement of the Navy's still non-operational SG-2G Super Seasprite aircraft with the NFH-90, with the Super Seasprite's sold to recoup some of the costs of this misguided program.

Under this scenario, the RAN would reduce its operational fleet down to two common variants of the one helicopter, resulting in substantial savings in training, spares support and crew interoperability.

Conclusion

The initial order for 12 MRH-90 helicopters reflects the results of ADF experience in a wide range of conflicts and peace keeping operations across the globe.

The MRH-90 is a welcome improvement of capability over the Black Hawk, which has served the ADF well for almost two decades, and as such will be welcomed by both operational planners and the front line ADF personnel who will trust their lives to the aircraft.

The initial order is insufficient to meet the needs of the ADF, particularly given the vastly increased tempo that the nation's participation in the "War on Terror" has called for. Phase 4 should deliver the real capability benefits required by the AIR 9000 project.

For Navy, the NFH-90 maritime warfare helicopter derivative of the NH-90 would prov de a suitable replacement for the current Seahawk and Super Seasprite helicopters and boost interoperability with Army in a time of ever increasing 'joint' operations.

The evolution of ADF helicopter operations have come a long way from the steaming jungles of Vietnam, and like the Huey and Black Hawk before it, the NH-90 will be called upon to take the nation's soldiers into harms way, and safely bring them out again.

The men and women of the ADF deserve the best the nation can procure for them, and it appears that in the MRH-90 they are getting the best medium troop lift helicopter in the world.

Two Army helicopter engineers fitting one of the two rotor blades to a Black Hawk for flying operations from one of the RAN's LPA's. (RAN)

The Last Gunfight Part 1

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. It was also the end of the battleship as the capital ship, as the aircraft carrier would continue to evolve as the most dangerous vessel in a Navy's order of battle.

After leaving the Philippines Islands under direct orders of President Franklin Roosevelt in 1942, General Douglas MacArthur, on his arrival in Australia made a statement promising to return to the Philippines Islands. In October, 1944, after two years of commanding forces and driving back the Japanese, MacArthur fulfilled his promise. He lead over 220,000 soldiers, sailors and airmen in a fleet of over 400 transports and 200 warships, including units of the RAN, to Leyte Gulf. This was known as Operation King II, the invasion of the southern Philippine islands.

For the Allies, the defeats inflicted by the Japanese over the first six months of the Pacific War ended after the Battle of Coral Sea in May, 1942. And by mid morning on June 4, the Pacific war had turned with the destruction of three IJN (Imperial Japanese Navy) aircraft carriers during the battle of Midway. By 1943, ships such as the new Essex class aircraft carriers were arriving from their shipyards. American battleship development ended after the Iowa class. The new Montana class battleships, designed to counter the Japanese Yamato class super battleships, were cancelled in 1942, just days after their keels were laid. With new ships and ever increasing manpower, the USN became the largest Navy in history. By the closing months of 1944, the USN had a thousand ships in service, from aircraft carriers to supply ships and with them the Allies, continued the 'Drive towards Tokyo'.

The losses in both men and materiel for the IJN to this point in time made a final victory all but impossible. By October, 1944 the IJN had lost most of its carrier aircraft, many during the battle of the Philippines Sea in June, 1944. Allied submarines were now operating successfully in Japanese controlled waters, sinking ships with much needed supplies. The threat to both the Philippines and the oil rich area of Brunei and Singapore was now too great. Indeed, if the Philippines was captured, the Japanese home islands would be within the range of allied long range bombers.

The Commander in Chief of the IJN, Admiral Toyoda Soemu, knew he had enough ships to attack the Allies in the Philippines. Thus, as his armada approached Leyte Gulf, the Japanese Navy believed they could carry the day. ADM Toyoda ordered the IJN to execute Operation Sho-1 ('Sho' is Japanese for Victory).

The commander for Operation Sho-1 was Vice Admiral Ozawa Jisaburo. The plan was for four IJN task forces made up of 63 ships to engage the Allied fleet in the Philippines. This was to be done with the four fleets formed in two groups; Northern Force attacking the Allied Fleet with the Mobile Force under VADM Ozawa, and 'A' Force, under the command of Vice Admiral Kurita Takeo. Mobile Force was a decoy force of four aircraft carriers, two battleship-aircraft carrier hybrids with virtually no aircraft embarked and 11 escorts. They would sail towards the Philippines from the north east, in order to entice the American aircraft carriers away from Leyte, leaving the US fleet with no air cover. 'A' Force consisted of the super battleships YAMATO and MUSASHI with the battleships HARUNA, NAGATO, and KONGO, nine heavy cruisers and numerous destroyer escorts. They were to sail from Singapore, refuel at Brunei Bay and attack the invasion fleet through the San Bernardino Strait.

The Northern Force would fight in three of the four battles that made up the battle of Leyte Gulf. The Battle of the Sibuyan Sea against US carrier aircraft from the US Third Fleet, the Battle of Samar Island with the US Seventh Fleet, and the Battle of Cape Engano, again against the US Third Fleet. The Japanese were to lose all three battles.

The Southern Force comprised 'C' Force and the 'Second Striking Force'. 'C' Force, under Vice Admiral Nishimura Shoji was comprised of two battleships, FUSO and YAMASHIRO, a heavy cruiser and four destroyers. It would leave Singapore, refuel at Brunei Bay, and then position itself to attack the Allied fleet from the south. The 'Second Striking

The battleship USS WEST VIRGINIA. Salvaged from the Japanese attack on Pearl Harbor she formed part of RADM Weyler's Battleship Division 4.

The battleship USS CALIFORNIA. Salvaged from the Harbour floor after the Japanese attacked her and many other ships at Pearl Harbor. She too formed part of RADM Weyler's Battleship Division 4. Only two battleships remained unsalvaged from the 'Day of Infamy'. USS ARIZONA and UTAH

Force', under the command Vice Admiral Shima Kiyohide would be made up of two heavy cruisers, NACHI and ASHIGARA, with five escorts and would sail from Formosa (Taiwan) and follow 'C' Force into Surigao Strait and onto Leyte.

The Northern and Southern Forces would form into a pincer movement, with the centre at Leyte Gulf. The objective was the destruction of both the huge collection of amphibious ships and transports of the invasion fleet, and the beachhead.

Standing in the way was Admiral William (Bull) Halsey's Third Fleet and Vice Admiral Thomas Kinkaid's Seventh Fleet. The latter approached the Philippines on the night of 19 October. Attached to VADM Kinkaid's Seventh Fleet were the destroyers, cruisers, and battleships belonging to Rear Admiral Jesse B. Oldendorf's Task Force 77.2. The Battleship Force (BattFor) was commanded by Rear Admiral George Weyler, and was made up of Battleship Division Four (BatDiv4) consisting of the USS MISSISSIPPI (BB-41), USS WEST VIRGINIA (BB-48), and USS MARYLAND (BB-46). Battleship Division Two (BatDiv2) consisted of the USS PENNSYLVANIA (BB-38), USS TENNESSEE (BB-43), and USS CALIFORNIA (BB-44). These last five battleships were salvaged from Pearl Harbor with all six ships forming the centrepiece of Seventh Fleet's Bombardment and Fire Support Group.

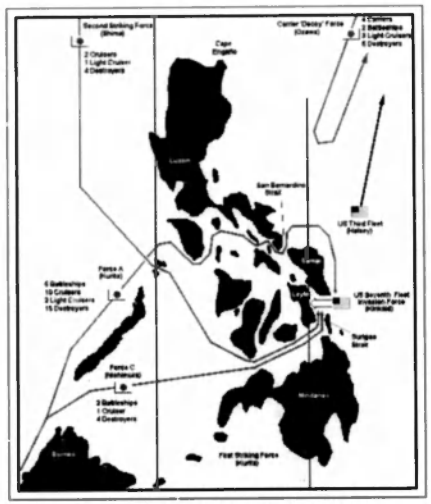
Also with the Seventh fleet were the RAN's Kent class heavy cruisers HMAS AUSTRALIA and SHROPSHIRE along with the Tribal class destroyers HMAS ARUNTA and WARRAMUNGA. The group was sailing as part of American Rear Admiral Russell Berkey's Close Covering Group (CTG), also known as Task Group 77.3. These ships provided the escort for the Bombardment and Fire Support Group.

At the beginning of the Leyte landings, on the early morning of 20 October, Oldendorf's Bombardment and Fire Support Group opened up on the Leyte beachhead with their 14 and 16-inch guns. At dawn, the first wave of American General Walter Krueger's 6th Army hit the beach, meeting

The Japanese super battleship MUSASHI on her way to Leyte Gulf as part of the IJN 'A' Force. 'A' Force was first discovered by a USN submarine and then by carrier reconnaissance aircraft. MUSASHI was attacked by 259 USN carrier aircraft and sunk.

light resistance. In Leyte Gulf itself, a new and deadly threat made its appearance for the first time. HMAS AUSTRALIA and several American ships of Task Force 77.3, were severely damaged by the first use by the Japanese of kamikaze attacks against ships. Later that morning General MacArthur arrived on the beachhead and announced to the world: "People of the Philippines, I have returned".

As the attack continued over the next few days, over 170,000 troops and over 250,000 tons of equipment and supplies were moved onto Leyte as Operation King II progressed. On 21 October HMAS WARRAMUNGA escorted the wounded AUSTRALIA to Manus for repairs. This left HMAS SHROPSHIRE commanded by Captain Charles Nicholls MVO, RAN, and HMAS ARUNTA, under Commander Alfred (Buck) Buchanan RAN, in Leyte Gulf, still with Task Force 77.3.



A map depicting the IJN attack plan for Leyte Gulf.

The IJN fleets sailed from Brunei and Formosa on 22 October. Elements of 'A' Force were spotted and attacked by American submarines off North Borneo on the 23rd with VADM Kurita's flagship ATAGO being sunk. Any element of surprise for the Japanese was lost and USN carrier based reconnaissance aircraft began to find the other Japanese units. Meanwhile Kurita's 'A' force was again discovered, this time in the Sibuyan Sea and attacked by 259 carrier aircraft. Ordnance rained down on the super battleship MUSASHI, which sank after being hit by 19 bombs and 17 torpedos.

On the morning of 24 October, VADM Kinkaid was alerted of VADM Nishimura's 'C' Force location and heading by aerial reconnaissance from the aircraft carriers USS ENTERPRISE (CV-6) and USS FRANKLIN (CV-13). At 0918hrs aircraft from the carriers attacked, causing minimal damage to YAMASHIRO, FUSO and the SHIGURE. At 1155 a United States Army Air Force (USAAF) bomber located the 'Second Striking Force' and reported back to VADM Kinkaid. After the earlier attack, the INJ ships continued on without further molestation, as the ENTERPRISE and FRANKLIN were ordered by ADM Halsey to instead attack Kurita's 'A' force in the Sibuyan Sea. The escort carriers (CVEs) of

Kinkaid's fleet were engaged in supporting the Leyte beachhead, which was by now secured with troops moving inland. But when Ozawa's Mobile Force was sighted, Halsey ordered his fleet north to engage, leaving Leyte Gulf unprotected. The Japanese deception plan had worked.

VADM Kinkaid and his staff realised that the two Japanese forces discovered south west of Leyte would need to go through Surigao Strait to attack the invasion fleet. In the afternoon, Kinkaid ordered all ships of the Seventh Fleet to prepare for a night battle. At 1443hrs RADM Oldendorf's Bombardment and Fire Support Group was ordered to head south to Surigao Strait, in preparation for a possible Japanese naval incursion. Sailing with Oldendorf's group was RADM Berkey's Close Covering Group (CTG), which included HMA SHIPS SHROPSHIRE, and ARUNTA, now part of Task Force 77.2.

Onboard his flagship, the heavy cruiser USS LOUISVILLE (CA-28), RADM Oldendorf and his staff began to deploy his force of 42 ships, splitting his forces into three groups. Oldendorf would command the left flank from LOUISVILLE, while RADM Berkey would command the ships on the right flank, which included SHROPSHIRE and ARUNTA. The group's battleships would operate under the command of RADM Weyler.

As Task Force 77.2 made for the eastern entrance of Surigao Strait, Oldendorf needed to confer with both Weyler and Berkey. With the heavy bombardment of the Leyte beachhead, the battleships had expended more than 60% of their heavy calibre ammunition. Most of the remainder was high explosive ammunition for shore bombardment, not the armour piercing shells needed for a fleet action. The three Admirals agreed that in order to conserve their ammunition, the battleships would wait until the enemy got to within 20,000 yards (18.2 kilometres) before opening fire. The first few salvos would use armour piercing shells before switching to the high explosive ammunition, the remaining supply of armour piercing shells were to be used against enemy battleships, if they appeared.

Meanwhile Kinkaid sent Oldendorf help in the form of every PT Boat assigned to Seventh Fleet. Thirty-nine PT Boats headed west into Surigao Strait at high speed as part of an emerging plan of attack. They would be Oldendorf's reconnaissance in lieu of both Kinkaid's lack of night aerial reconnaissance and the departure north of Third Fleet's night aerial reconnaissance assets (onboard USS INDEPENDENCE, CVL-22). By early evening, Oldendorf's force consisted of 81 ships, ranging from PT Boats to battleships. Two night flying Catalina Flying Boats (known as 'Black Cats') tried to find the Japanese but without success. One of them was mistakenly shot down by the PT Boats, now in position on the western end of the strait.

A very scratchy picture of the ships of 'A' Force leaving Brunei Bay after refuelling and heading for the San Bernardino Strait.

The cruiser USS LOUISVILLE acted as RADM Oldendorf's flag ship for Task Group 77.2.

At 1830hrs VADM Nishimura received word of 'A' Force's delay from air attacks in the Sibuyan Sea. Nishimura understood this meant that if his ships made it to Leyte Gulf, he would be alone. There would be no support from the north of the gulf. At 1900hrs an all ships signal was sent by ADM Toyoda: "All ships dash to the attack, counting on divine assistance." Nishimura's ships steamed eastward into the night.

After sunset Oldendorf executed his plans. For RADM Weyler and his battleships, WEST VIRGINIA, CALIFORNIA, PENNSYLVANIA, MARYLAND, and TENNESSEE, this was the moment they had waited for since that "Day of Infamy". These were ships salvaged from the water (PENNSYLVANIA was in drydock and was damaged during the attack) at Pearl Harbor and refitted. Along with the battleship MISSISSIPPI, Weyler's flagship, the battle line was complete, and was escorted by the six destroyers from Destroyer Division X-Ray. The six battleships were steaming in 'Line Ahead' formation across the strait, waiting for the enemy to arrive.

Further into the strait on the right flank were RADM Berkey's ships. Flying his flag from the Pearl Harbor survivor, the cruiser USS PHOENIX (CL-44), Berkey had HMAS SHROPSHIRE along with the cruisers USS BOISE (CL-47) and two destroyer squadrons, DESRON 54 with seven destroyers, and DESRON 24 consisting of six destroyers including HMAS ARUNTA. On the left flank, Oldendort onboard his flagship LOUISVILLE, led the cruisers MINNEAPOLIS (CA-36), DENVER (CL-58), PORTLAND (CA-33), and COLOMBIA (CL-56), together with Destroyer Squadron 56, consisting of nine destroyers. Near the western exit of the strait 39 PT Boats waited in thirteen groups of three, each in positions either side of the mouth of the strait, waiting to report back to the admiral.

Eighty-one Allied warships waited in and around Surigao Strait, without aircraft carrier support. The updated fire control radars of Oldendorf's fleet watched for the seven ships of Nishimura's 'C' Force, which were moving towards them, unaware of what was waiting for them on that moonless night.

From Nishimura's flagship YAMASHIRO, the only light the crew saw was the lightning of a midnight storm on the southern horizon over Mindanao. Several ships in 'C' Force had an early version of a fire control radar supplied by Germany and fitted before Operation Sho-1 began. It was hoped that this would be a decisive advantage.

In the late evening of 24 October, 'C' Force arrived at the western end of Surigao Strait. Nishimura ordered the MOGAMI and the three destroyers MICHISHO, ASAGUMO and YAMAGUMO to proceed ahead to conduct reconnaissance for the rest of the force. As the four ships headed east into the strait, they and the PT Boats they were searching for managed to pass each other undetected. As

FUSO, YAMASHIRO and SHIGURE began to move into the strait, they were detected off the island of Bohol by the fire control radar of PT-131, at 2236hrs. Moments later PT-131 and two other PT Boats made for the three ships and at 2250 saw their targets steaming east, but shortly after the destroyer SHIGURE spotted them. On hearing that contact with the enemy had been made, Nishimura ordered his ships to turn towards the PT Boats and to turn on their searchlights. The PT boats were running in at 40 knots when the SHIGURE, FUSO, and YAMASHIRO opened fire. The barrage forced the PT Boats off their attack runs and caused damage to two of their number. The three Japanese ships resumed their course.

Contact reports from the PT Boats took their time to reach RADM Oldendorf. At 0026hrs on 25 October he got their report which confirmed the information first received by Seventh Fleet earlier in the day of a possible Japanese naval incursion south of Leyte.

At 0030hrs Nishimura radioed VADM Shima and VADM Kurita and informed them that he was "advancing as scheduled while destroying enemy torpedo boats." As SHIGURE, FUSO, and YAMASHIRO continued east, Nishimura watched as each PT Boat group attacked with torpedos, only to be spotted in the searchlights and driven off while deploying a smoke screen to hide behind. The three ships were undamaged, but their fire control radars could not pick up the PT Boats. The radar was getting interference from reflections of the islands and coastline around the strait. At 0040 Nishimura's ships rendezvoused with MOGAMI, MICHISHO, ASAGUMO and YAMAGUMO and by 0100hrs they sailed eastwards as a fleet. The PT Boats conducted their last attacks during this time, with PT-493 damaged by gunfire and driven onto Panson Island, where later that morning she sank. By 0215 the PT Boats were behind them, and 'C' Force continued onwards. Shortly after, Nishimura ordered his ships into battle formation.

Meanwhile Vice Admiral Shima's 'Second Striking Force' was nearing Surigao Strait. With his flag flying on the heavy cruiser NACHI, Shima knew that Nishimura's ships were already in the strait. But there was no active co-ordination between the 'Second Striking Force' and 'C' Force, so both Japanese fleets moved toward battle not knowing the other's intentions.

Waiting for Nishimura's ships further into the strait was the next hurdle. DESRON 54 under the command of Captain Jesse Coward. Coward's plan of attack was to hit the Japanese from both sides in a torpedo attack by his five destroyers, as their five-inch guns would be ineffective against the heavy ships. At 0206hrs Captain Coward ordered the ships of DESRON 54 to 'General Quarters' and their the crews waited until 0240 when one of the three destroyers on the eastern side of the strait, USS McGOWAN (DD-678) made radar contact with Nishimura's ships. By 0245 the radar picture showed a line of ships fifteen miles (24 kilometres) away and closing.

The RAN heavy cruiser HMAS SHROPSHIRE. SHROPSHIRE and the destroyer ARUNTA were part of Task Group 77.3.

The heavy cruiser USS PHOENIX. PHOENIX was RADM Berkley's flagship during the battle and operated alongside HMAS SHROPSHIRE. PHOENIX survived the Japanese attack on Pearl Harbor, the Battle of Leyte Gulf and World War II. She later became the Argentine ship GENERAL BELGRANO and was sunk in 1982 by a Royal Navy nuclear powered submarine

Nishimura's ships meanwhile had moved into battle formation. The destroyers MICHISHO, SHIGURE, ASAGUMO and YAMAGUMO lead YAMASHIRO, FUSO, and MOGAMI in 'Line ahead' formation with 1000 metres separation. At 0256hrs, lookouts from the SHIGURE spotted three destroyers 4.3 miles (6.9 kilometres) ahead of them. YAMASHIRO turned her searchlight towards them but the battleship could not locate them before steaming pass them.

With a closing speed of 45 knots, 'C' Force and DESRON 54 were rapidly coming together. Shortly after, the destroyers on the western side of the strait, which had been steaming close to Leyte's shoreline in the hope of avoiding Japanese radar, picked up the Japanese on their own radar. Now the picture became clearer as both the Japanese and the western destroyers were steaming directly at each other. Captain Coward ordered them to turn to the southeast at 0257, placing 'C' Force across the western destroyers' starboard bow. A minute later, lookouts onboard USS MELVIN (DD-680) sighted the Japanese destroyers. Coward ordered DESRON 54 to lay a smoke screen, increase speed to 30 knots, and signalled his destroyers to "Fire when ready".

'C' Force and DESRON 54 engaged at 0300 when the destroyers McGOWAN, and MELVIN launched the first of 27 torpedos between them at 'C' Force. As McGOWAN, and MELVIN began to withdraw they were fired on by the YAMAGUMO, MICHISHO, SHIGURE, ASAGUMO, as well as the YAMASHIRO. Both McGOWAN, and MELVIN put on speed as the Japanese salvos straddled both destroyers before they steamed out of range. As they left, explosions filled the night as MELVIN's torpedo shot hit the battleship FUSO, causing major damage and forcing the battleship to first slow down and then move out of formation. Nishimura continued on, not realising that FUSO was no longer with him. The rest of Nishimura's force continued on, unsuccessfully trying to hit the retreating destroyers.

At 0308hrs, as FUSO was hit, two destroyers had managed to get close to 'C' Force and had begun their attack runs on the remaining ships. USS McDERMUT (DD-677) and USS MONSSEN (DD-798) opened fire with torpedos at 0310hrs. Unlike the previous attack, Nishimura ordered two 90-degree turns hoping this would avoid the torpedos, yet it did the opposite. At 0320hrs torpedos from McDERMUT severely damaging MICHISHO and sank YAMAGUMO, while another destroyed ASAGUMO'S bow, leaving the destroyer to make her own way out of the strait. One of MONSSEN'S torpedos hit YAMASHIRO, but the battleship suffered no major damage. MONSSEN and McDERMUT withdrew as YAMASHIRO and the remaining three Japanese ships steamed past the doomed MICHISHO and ASAGUMO.

...to be continued

HATCH, MATCH & DISPATCH

Match
BALLARAT flies the White Ensign

The RAN welcomed the arrival into Commission of the latest ANZAC frigate into the fleet at a slightly different ceremony at Docklands in Melbourne on 26 June 2004.

Notable for being conducted at twilight and festivities extending well into the evening it looked as though disaster might strike at any minute with threatening skies, however, the expected showers provided barely a sprinkle early in the event. The ceremony was the culmination of a very hectic few days for the crew. Of major concern was the location chosen for the commissioning, the berthing area being adjacent to the very new Docklands Development at the old Victoria Docks, near Melbourne City. Measurements being made of the critical clearance of the recently built Bolte Bridge over the Yarra River, under which NUSHIP BALLARAT had to pass to access the berth. This was the first large vessel to pass under the bridge and clearance was estimated to be as little at 80cm (at low tide!). She passed under the bridge at 1.15am on a very windy evening several days prior to the ceremony. The sigh of relief was almost audible suburbs away.

The Commissioning Lady for the occasion being Dr Susanna Herd her father having served on the original BALLARAT during World War II. Dr Herd had named and launched BALLARAT originally at Williamstown in May 2002. Other distinguished guests included the Minister for Defence Hon. Robert Hill, the Chief of Navy Vice Admiral Richie and the then Maritime Commander Rear Admiral Raydon Gates.

Conducting the ceremony and taking command of HMAS BALLARAT was Commander David Hunter who together with the efforts of his cheerful crew turned on a wonderful spectacle for the invited guests and the public on the evening.

NUSHIP BALLARAT during her twilight transition to HMAS BALLARAT (Kevin Dunn, Fleetline).

Highlights included the extensive use of coloured spot lights and projections onto the ships' immaculate hull, pyrotechnics as well as the presence of the RAN band and various demonstrations provided by the City of Ballarat. This included a very loud rifle salute by a group of costumed Redcoats from the goldfield days.

A spectacular start to what will no doubt be a long and successful career in the fleet.

BALLARAT is the second ship in the RAN to bear the name, the first being one of the 60 Bathurst Class corvettes of World War II fame, which incidentally was also built at the Naval Dockyard Williamstown.

The sixth ANZAC FFH to be commissioned into the RAN, HMAS BALLARAT was the eighth built at Tenix Defence at Williamstown in Victoria. The previous being six for the RAN and two for the RNZN.

By Kevin Dunn

NUSHIP BALLARAT manoeuvring into position for her commissioning (Kevin Dunn, Fleetline)

PRODUCT REVIEW

A PROUD AMERICAN

The Autobiography of Joe Foss
Review copy supplied by:
Crusader Trading
9 Townsville St, Fyshwick, ACT 2609
www.crusaderbooks.com.au
(02) 6239 2332
RRP: $71.50
Reviewed by Lionel Hutz

In America, Joe Foss is one of the best-known personalities to have emerged from World War II. Fortunately, Joe and his wife 'didi' skillfully put his remarkable story into this fascinating book, *A Proud American*.

Joe Foss was a genuine American hero who is said to have later served as a role model for the youth of America. As a small town farm boy whose father died in a tragic accident when Joe was still a teenager, he willingly accepted the responsibility of providing for his family's financial needs. Despite great obstacles, Joe went on to live the American dream. He enjoyed several highly successful careers, from a World War II Top Marine Fighter Ace with Distinguished Flying Cross; Congressional Medal of Honor recipient; Brigadier General and Chief of Staff, South Dakota Air National Guard; Governor of South Dakota; Commissioner of the American Football League; to a Television Actor. But these are just the highlights of a long, distinguished list of accomplishments and activities.

For readers of *THE NAVY* his book deals with his War exploits in the Pacific theatre flying over embattled Guadalcanal in the very darkest days of the autumn and winter of 1942-43, this aggressive and talented flying 'Leatherneck' became the first American World War II pilot to match Captain Eddie Rickenbacker's World War I record of 26 confirmed aerial victories. Joe's feat also earned him the Congressional Medal of Honor – as much for his leadership skills as for his marksmanship. In turn, this singular achievement, which came at a time when positive news of the war was rare, fired the imagination of the American public and turned Joe Foss into a popular – and historical – icon of American patriotism.

After the war, Joe Foss entered politics, becoming South Dakota's youngest Governor. In the 1960s he became the founding commissioner of the American Football League and was instrumental in creating the Super Bowl. He once again became a well-known public figure through creating and hosting the successful television program, *'The American Sportsman'*. Later on, Joe and 'didi' Foss founded The JOE FOSS Institute.

A Proud American is an exciting, inspirational book, not to be missed.

"There's nothing I wouldn't do for this country." – General Joe Foss

FORGOTTEN FLEET 2

By Bill Lunney and Ruth Lunney
Forfleet Publishing
Reviewed by Ross Gillett

This book is a credit to its authors. From the outset it is very apparent that an enormous amount of research has gone into producing this high quality publication. *Forgotten Fleet 2* is the story of the Australian ships and Australian men who served with the US Army Small Ships Section in New Guinea during the Second World War.

Forgotten Fleet 2 is a compilation of thousands of facts covering approximately 1,000 vessels and more than 1,500 personnel. The degree to which the authors have researched is overwhelming. In fact it spans 367 pages of information and photographs. The book is arranged via Part A, comprising 15 chapters of history from the beginning to victory, then Part B, based around eight Tall Tales and True, then Part C covering the ships and their personnel.

What is more outstanding are the special features, additional stories from the personnel in their own words, spread through the book. Some subjects include; The Small Ships Experience, Undisciplined, Cruising in Style, Milne Bay Mutiny and The Fallen.

The ships of the Forgotten Fleet were an odd assortment. Tug boats, ketches, old ferries, a former Great War four stacker destroyer, a paddle-wheeler, through to new purpose built lighters, launches and freighters. Even an old South Australian colonial light cruiser, HMCS, later HMAS PROTECTOR rates a mention.

Highly recommended. To secure a copy of *Forgotten Fleet 2*, contact the authors on (02) 4982 8437 or fax on (02) 4982 8423

THE LAST SAMURAI – DVD

Movie
Warner Brothers
Rated MA
RRP $29.83
Reviewed by James Rickards

Possibly one of the year's strongest DVD releases, Tom Cruise's latest action epic is an exciting and violent tale of the tragic fall of the samurai culture as Japan entered the modern era.

Featuring Cruise as a washed-up American civil war captain enticed to Japan to train the Emperor's army in modern warfare, this is the actor's best work to date.

While Cruise excels as a scarred soldier who finds solace in the culture and sense of battlefield honour of the samurai after having initially been taken as their prisoner, it is his Oscar nominated co-star Ken Watanabe who truly owns the film.

As the remaining samurai leader loyal to his Emperor but forced to battle his modern army to preserve the samurai people, history and culture, Watanabe's warrior is an impressive man of action and intense personal reflection.

On DVD, The Last Samurai looks and sounds phenomenal. Visually the film is crisp with the New Zealand scenery a stunning substitute for Japan and little grain or shadowing apparent on screen during the film's numerous battles, training montages and night sequences.

Featuring a second disc of well crafted and carefully managed extras, the two-disc set also offers viewers an intriguing insight to the highly detailed production, complexity of the actor's training, orchestration of the film's battle scenes and a showcase of samurai history.

For enthusiasts of the samurai, lovers of quality action films and fans of epic cinema, The Last Samurai is exciting in its action and emotive in its depiction of a culture lost.

STRIKE FROM THE SEA

The Royal Navy and US Navy at War in the Middle East
1949 - 2003
By Iain Ballantyne
Pen & Sword Books Limited
ISBN: 1 84415 059 3
Reviewed by Lionel Hutz
Price: £19.95
Hardback
e-mail: enquiries@pen-and-sword.co.uk
www.pen-and-sword.co.uk

The Arabian Gulf has been at the centre of the world stage for over fifty years, due to the region's all important oilfields, upon which the global economy depends. In this fascinating book, Iain Ballantyne examines the role of the British and American navies, charting their actions from shortly after the Second World War to the present. He describes the US Navy and Royal Navy response to various disputes down the decades, from the Abadan Crisis of 1951, the Suez fiasco of 1956, the Tanker War of the 1980s, confronting Libya, DESERT STORM in 1991, the post-September 11th War on Terrorism and, finally, the Iraq War of 2003 that deposed Saddam Hussein.

The author's contacts within the US and UK naval communities have yielded inside stories of tense deployments and combat action, with many people speaking for the first time about their key roles and the risks they faced. Of particular interest to naval enthusiasts will be the descriptions of evolving capabilities, including the critical importance of aircraft carriers projecting power. The contribution made by other fleets in recent wars, particularly the Royal Australian Navy, is not overlooked. However, it is the 'Special Relationship' embodied by the Anglo-American naval axis that lies at the heart of this vivid account, which does not ignore moments of US-UK tension.

Strike From The Sea will have wide appeal as a well-written and accessible insight, from a naval perspective, on what has been, and remains, one of the world's most dangerous flashpoints. The authoritative text is superbly supported by a splendid selection of photographs, most of them reproduced in colour.

Iain Ballantyne is editor of the global naval affairs magazine Warships IFR and has been a contributor to *THE NAVY*. He is also the author of *WARSPITE* and HMS LONDON, the first two titles in Pen & Sword's Warships of the Royal Navy series.

THE BATTLE OF BRITAIN – DVD

Movie
2-Disc DVD
Wide Screen edition
MGM
Directed by Guy Hamilton
Reviewed by: Steve Bennet
$28.95

Despite being a dramatised version of historical events, The Battle of Britain sticks closely to the facts, and doesn't overplay history. As well as honouring the brave pilots, it also points out the sequences of events and bad decisions that contributed to the German defeat and the problems faced by the RAF.

Great acting by a whole host of household names from the high water mark of the British film industry (Michael Caine, Kenneth More, Laurence Olivier, Robert Shaw, Susannah York, and Trevor Howard, to name but a few), is largely responsible for the success of this film.

Scraping together aircraft from museums and enthusiasts all over the world, as well as loaning ME-109s and HE-111s from the Spanish air force, the filmmakers managed to capture very believable aerial action regarded by many as still better than modern movies like 'TOP GUN'. Using an airborne camera crew, working inside a B-25 Mitchell bomber, we see Spitfires, Hurricanes, ME-109s, and Heinkels blasting all over the sky in all manner of dog fighting. When you discover they filmed different bits of all the fights in different parts of Europe, and with different numbers of aircraft (sometimes only one British fighter), then seamlessly joined it all together, it makes it an even more amazing feat.

The film also manages to fit a broad coverage of different aspects to the story, within its 2 hour runtime. We don't just see the pilots, but also the Fighter control system that was in place (including the vital radar operators and members of the observer corps), the people in power making the decisions, the people of London, the foreign squadrons, and even the German point of view.

Due to the lack of available Hurricanes, you sometimes get the impression that the Spitfire won the battle, when in fact it was Hurricanes that made up the majority of the RAF at the time and thus regarded as the decisive weapon of the battle as they went after the bombers.

This transfer is presented in widescreen (16x9 enhanced). This is the original theatrical aspect ratio and having only seen the film before on TV I can't believe I was ever satisfied with that horrible 4:3 version. If you are fan of this movie or thought it was 'pretty good' then you need to see it again in all its widescreen glory.

Five additional featurettes involving documentaries on the making of this magnificent movie are included on the second disc. The video transfer is close to being superb for a film that's 35 years old. Sound has been done in Dolby 5.1 for fantastic sound effects of the battles and that unique sound of the spitfire's Merlin engine.

The Battle of Britain 2-Disc DVD set from MGM is highly recommended, tally ho . . .

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:

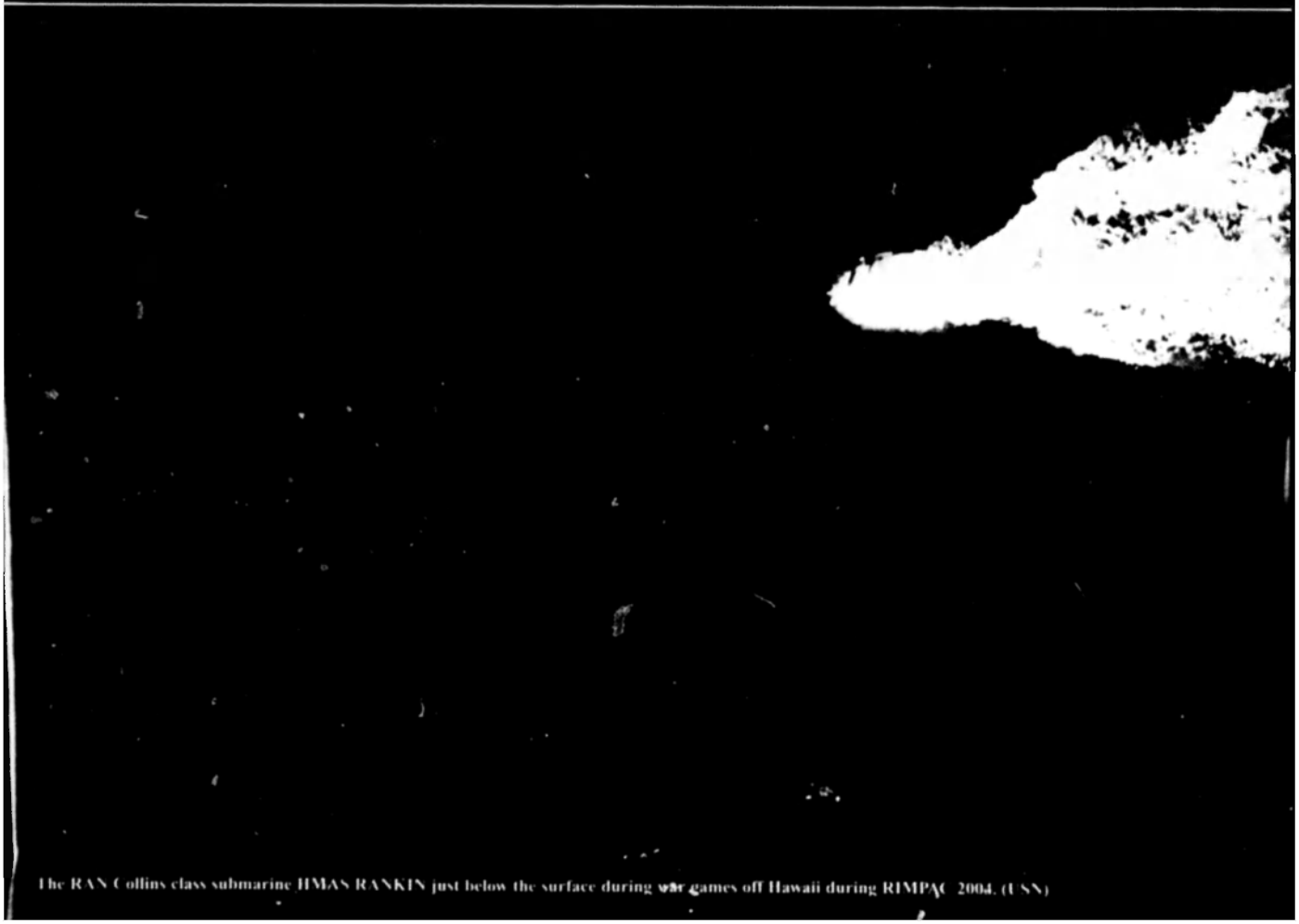
- Supports the concept of a Navy capable of effective action off both East and West coasts simultaneously and advocates a gradual build up of the Fleet to ensure that, in conjunction with the RAAF, this can be achieved against any force which could be deployed in our general area.
- Is concerned that 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.

(From R to L) HMA Ships NEWCASTLE, SUCCESS and PARRAMATTA at sea and transiting to Hawaii for RIMPAC 2004. (RAN)



The RAN Collins class submarine HMAS RANKIN just below the surface during war games off Hawaii during RIMPAC 2004. (USN)

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The Canadian destroyer HMCS ALGONQUIN steams in formation with USS JOHN C. STENNIS (CVN-74) during RIMPAC 2004

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