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THE NAVY

THE MAGAZINE OF THE NAVY LEAGUE OF AUSTRALIA

THE RN'S FIRST JOINT STRIKE FIGHTER

USN FRIGATES FADING

THE FLOWER CLASS CORVETTES

ARMY'S VIEW OF MARITIME SECURITY STRATEGY

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One of the RAN's new Seahawk 'Romeo' maritime helicopters during the first live firing of an AGM-114 laser guided Hellfire missile. The addition of the Hellfire gives the RAN a direct fire anti-surface capability not seen since the retirement of the A-4 Skyhawk. (RAN)

The FFG HMAS DARWIN off Sydney heads. (RAN)

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Front cover: The now decommissioned USN Oliver Hazard Perry class FFG USS UNDERWOOD. The Oliver Hazard Perry class of frigates have been the real workhorse for the USN, particularly lately with their success in countering the narcotics trade in the Caribbean and Pacific Ocean. (USN)

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NAVAL AIR – FIRST TO FIGHT

The recent unchecked 'slaughter fest' of innocent people being perpetrated in northern Iraq has horrified and sickened the civilised world.

Public beheadings, crucifixions, torture, enforced slavery and extortion may have been the norms before the 15th century (without the Twitter and Face Book boasting) but thankfully most of us have evolved beyond that violent savagery.

However, sometimes you need to fight fire with fire. The 21st century response to these evil armed thugs and murderers came in the form of naval air power. Specifically, US Navy aircraft from the aircraft carrier USS GEORGE H.W. BUSH were the first to fight and stand up for civilisation.

Carrier borne F/A-18 Hornet fighters went deep into northern Iraq, at short notice, to carry out targeted strikes on elements of the group claiming to be an "Islamic State" - who at the time had cornered a religious minority group called the Yazidi on Mount Sinjar singling them out for murder and/or slavery for their women and children. This immediate and effective action by naval air power made it possible for the safe supply of essentials to those people trapped on the mountain.

Naval air, later backed up by land based air, effectively turned the tide on these murdering thugs and made it safe enough for transport aircraft to land at airports and air strips in the Kurdish parts of Northern Iraq to supply the 'Islamic State's' intended victims with the necessary weaponry to fight off these bullies.

The fact that such a quick response from the order to 'go' to 'ka-boom' could take place seems to be largely taken for granted. The attributes of naval airpower being able to be on the spot without lengthy 3rd country agreements and build-up time and being able to send ready strike packages immediately while fully supported and defendable were, again, on display for all to see. Sadly and predictably this has so far been unappreciated.

Australia rightly took offence at what was going on in Northern Iraq and started air drops of essential supplies alongside the air strikes. The government also stated talking up the prospect of RAAF F/A-18 Super Hornets joining the US strike efforts against the murdering thugs.

Upon this news one media outlet reported, inaccurately, that our Super Hornets would be operating from the aircraft carrier USS GEORGE H.W. BUSH.

This would not be the case but it was an understandable error of logic which had at its core a blindingly obvious quality. Why can't our 'stock standard' USN F/A-18F Super Hornets fly from an American aircraft carrier in order to relive USN squadrons and show the Australian flag, as well as the RAAF's professionalism in the strike role?

Our Super Hornets were sold to the RAAF as an FMS (Foreign Military Sale) purchase. The US FMS programme is a form of security assistance authorised by the US Arms Export Control Act (AECA) and considered a fundamental tool of US foreign policy.

Under Section 3, of the AECA, the US may sell defence articles and services to foreign countries and international organisations when the US President formally finds that to do so will strengthen the security of the US and promote world peace. Australia's special relationship with the US tends to over support this requirement which enables us access to the most sophisticated of US weaponry.

Under FMS the US Government and a foreign government enter into a government-to-government sales agreement. The international agreement is called a Letter of Offer and Acceptance (LOA). The deal also enhances the buying power of the FMS recipient as the additional articles come under the US Military's bulk purchase deal with the maker.

Under an FMS agreement, our Super Hornets were straight off the USN's own existing production line order.

Part of the rationale for the purchase of the RAAF Super Hornet was that it would be a bridging capability to account for delays in the F-35A JSF purchase. Once the JSF started being delivered to the RAAF the options for the Super Hornets' future included selling them back to the USN. Thus commonality with the USN, including all USN upgrades during the next 10 years, was part of the purchase price and negotiation agreement.

A USMC F-35B on the deck of the LHD USS WASP. Australia should consider the acquisition of some of the B model of the JSF as allies' F-35Bs may not always be available to Australia to 'cross deck' as part of its contribution to future coalitions or for our own defence.

Given this commonality our Super Hornets could in fact operate from the USN's carriers, with little modification. The only impediment would be the training needed to land on an aircraft carrier.

However, RAAF Super Hornets operating from USN carriers will of course never happen and if RAAF Super Hornets are ever used overseas it will be from a land base. But for a government looking for options it may be worth considering for the future, particularly given another 12 Super Hornet 'Growler' electronic warfare aircraft are on order for the RAAF.

Another option for Australian involvement in future 'coalitions of the very willing' is the use of the Canberra class CVLs (HMA Ships CANBERRA and ADELAIDE) as another flight deck for coalition aircraft such as RN or USMC F-35B STOVL (Short Take Off and Vertcally Landing) JSF aircraft participating in strike operations. The extra deck provided by the RAN would free up the RN's/USN's assets to allow an operational break in order to regroup and reorganise for another period of strike operations.

Politically this could be very attractive as Australia would be seen providing an almost disproportionate response to the operation, while not sharing the same risk, as aircraft carrier decks are hard to come by.

But however politically attractive that may be, it must be remembered that at the end of the day the prime role of Australia's navy is defending Australia and its interests, and we may well not have the luxury of somebody else's STOVL JSF's to use from our Canberra class CVLs for that role. Thus it would be better if we had our own.

Postscript: Since writing this editorial the Government has announced that eight RAAF Super Hornets will be sent to The United Arab Emirates with an AEW&C aircraft. Given the distances expected to be involved in supporting strikes against the so called 'Islamic State', approx 1,300kms each way, an in-flight refuelling aircraft will also be sent. A small contingent of Special Forces will also be included to act as advisers. Ironically, the force mix being deployed is something that could be accommodated on a Canberra class CVL with F-35B JSF. Eight F-35B could easily fit onto a Canberra class CVL without the need for the tanker aircraft as the ship can position itself in the north of the Persian Gulf and cut out nearly 400kms each way. The AEW&C is a different issue but there are helicopter based AEW&C solutions available. The Special Forces could also live aboard and even conduct some training of local forces on board too.

DEFENCE IN A TROUBLED WORLD

In April the Prime Minister and the Minister for Defence announced that Defence will produce a White Paper which is to be completed in 2015. The development of the White Paper is now well and truly under way.

It is hard to think of any Defence White Paper in recent times which has been prepared against such a backdrop of actual or threatened conflict.

Simply to list the active conflicts is instructive. In Africa there are wars of various levels of intensity in Nigeria, the Central African Republic, the Sudan, South Sudan, Somalia and Libya. Some of these conflicts might be described as civil wars, though in many instances there is at least some external involvement.

In the Middle East the Israel/Gaza conflict is ongoing. In both Syria and Iraq major conflict continues. It is reported the Syrian death toll now exceeds 190,000. Syria and Iraq are civil wars with external involvement.

In Eastern Europe the situation in the Ukraine is unresolved. The present fighting in eastern Ukraine can be described as a civil war, but there is very clear external involvement. The occupation and appropriation of the Crimea by Russia, however it might be dressed up, was an invasion by a more powerful state into a less powerful neighbour.

In our part of the world conflict is more threatened than actual. North Korea of course comes to mind, but perhaps of more concern are the disputes between China and Japan, Taiwan, the Philippines and Vietnam. There have already been maritime incidents involving China. In the South China Sea Vietnam is seeking to resist China`s assertion of its right to drill for oil and gas. This may yet prove to be another example of a more powerful state and a less powerful neighbour.

The above is not complete list of actual or threatened conflicts around the world. It is however sufficient to illustrate the scale of the task those charged with preparing the White Paper now face.

This is not to suggest that Australia will be involved in any particular conflict. But as recent events have shown, distant events can impact on Australia in unexpected ways. Who at the beginning of this year would have anticipated Australia deploying RAAF aircraft to Kiev, police to Eastern Ukraine or doing airdrops over Kurdistan?

It is also worth noting that the various conflicts in Africa, the Middle East and Eastern Europe have the potential to result in a significant diversion of effort by the United States from its pivot to Asia.

It is worth pondering just how many of the conflicts mentioned above, actual or threatened, would have been anticipated 25 or 30 years ago. It is a thought worth pondering because many of the ships and aircraft now operated by the ADF were ordered or at least planned, that long ago. The decisions flowing from the 2015 White Paper will no doubt result in the acquisition of ships and aircraft which will be operational 25 or 30 years hence.

It is against this backdrop that the Defence White Paper is being undertaken.

There can be no doubt that the White Paper process involves a thorough examination of many matters relevant to Australia`s Defence. It is perhaps sufficient just to set out the themes that individuals or organisations are asked to consider when putting in submissions to the White Paper. Those themes are:

- Australia`s Strategic Policy Approach:
- Strategic Interests;
- Objectives for the ADF;
- Australia`s Military Strategy.

ISIL militants marching through a captured town in Northern Iraq towards Bagdad. Where will the march stop?

- ADF Force Posture and bases;
- International Relationships;
- Force Structure and Preparedness;
- Defence Budget and Finances;
- Defence Culture;
- Personnel;
- Organisational Reform;
- Science and Technology;
- Industry Policy and the Defence Materiel Organisation;
- Defence and Regional Australia.

As part of the White Paper process an Expert Panel has been established to undertake what is described as 'targeted" community consultation.

The community consultation open to the public has been held in nine meetings in the capital cities and in some major regional centres around Australia. These meetings were arranged by the RUSI. A number of Navy League members attended these meetings

The consultation programme by invitation only has involved some 20 or so public policy think tanks. The Expert Panel has also held meetings with Defence Industry.

The Navy League welcomes this thorough-going approach to the task of developing the White Paper.

The Navy League has provided a submission on previous occasions that an Australian Government has undertaken a Defence White Paper. The Navy League will be making a submission to this White Paper.

THE RN'S FIRST JOINT STRIKE FIGHTER

By CDR David Hobbs, MBE, RN (Rtd)

With the introduction of the US built F-35B JSF into the RN, noted aviation writer David Hobbs takes a look back at the last US built fighter aircraft used by RN. The F-4 Phantom.

The Lockheed Martin F-35 Lightning II is the most expensive weapons system ever procured for the United States' armed forces and its Allies. However, sixty years ago a strike fighter was designed which served the US Navy, Marine Corps and Air Force with distinction. The McDonnell F-4H Phantom II first flew in 1958 and became an instant success, winning export orders from the UK, Australia (temporary lease), Egypt, Greece, Iran, Israel, Japan, South Korea, Spain, Turkey, and Germany as well as huge orders from the US armed services during the Vietnam War. Some export Phantoms have upgraded avionics and are still flying operationally today.

THE MCDONNELL F-4H PHANTOM II

James S McDonnell founded his company in July 1939 with a small, rented, office and a secretary. With the stimulus of war he assembled a team that specialised in jet aircraft design and won a USN contract to produce what became the first carrier-borne jet fighter. It flew in January 1945, evolved into the FH-1 Phantom and saw limited but successful service with the USN. A more powerful derivative, the F-2H Banshee, first flew in 1947, achieved a production run of 895 aircraft and served with the USN and the Royal Canadian Navy. It was not finally retired until the early 1960s. Its successor, the F-3H Demon, followed in 1951 and became the first fighter to be equipped with both infra-red homing and radar guided missiles. Over 400 were built and the type remained in service with the USN until 1965.

The long-range F-101 Voodoo entered service with the US Air Force in 1954 furthering McDonnell's reputation for building advanced supersonic fighter designs, although Canada had been his only export success. Disappointment hit McDonnell and his team hard, therefore, when Chance Vought won a USN competition for a supersonic day fighter that became the F-8U Crusader. They could have taken the 'safe' option to diversify away from the fighter business but decided, bravely, to design a private venture 'all-can-do' fighter, even though there was no requirement for such an aircraft from any of the US armed forces at the time.

US Naval opinion was canvassed and a mock-up constructed to show what the aircraft would look like. It lacked internal detail but revealed a twin-engined, single-seat, radar-equipped strike fighter with four 20mm cannon and eleven hard points for weapons under the wings. It was to be capable of carrying every airborne weapon in the USN inventory and the engines were to be Wright J-65s, licence built versions of the British Armstrong Siddeley Sapphire, giving an estimated maximum speed of Mach 1.5 at high altitude. McDonnell funded the development of variable geometry engine air intakes to improve performance at all heights and speeds. The mock-up impressed the USN Bureau of Aircraft, BuAir, and two technology demonstration airframes were ordered in November 1954 but with newly-developed General Electric J-79 turbojet engines replacing the J-65s. They were to be strike aircraft, tentatively designated the AH-1, but that changed in April 1955 when officers representing the Chief of Naval Operations and BuAir travelled to McDonnell's factory in St Louis, Missouri to discuss the

The first F-4K for the RN landing at the McDonnell factory at St.Louis during its acceptance testing period in 1966. Political inspired modifications to the RN version made it slower, twice as expensive as the US version as well as adding enough complexity to delay delivery.

An RN F-4K flying over RNAS Yoevilton. The RN acquired 52 Phantoms for use from the carrier HMS ARK ROYAL.

project. Their first meeting was the stuff of legend; it lasted less than one hour and decided that the new aircraft was to be a fleet fighter capable of spending two hours on combat air patrol, CAP, 250 nautical miles (463 kilometres) from a carrier armed with both radar-guided and infra-red homing missiles but no guns. A second crew-member to be known as a radar intercept officer, RIO, was added to help with the high pilot workload; the choice of J-79 engines was confirmed and the underwing hard points were to be retained giving the aircraft an attack capability better than most aircraft designed for the role. The aircraft was designated as the F-4H and given the name Phantom II. Work on two prototypes was started immediately and an order for them was confirmed in May 1955. The Navy agreed the production specification in July 1955, less than 12 weeks after the April meeting with no airframe changes necessary until the first export customer, the UK, specified different engines.

The first prototype XF4H-1 flew on 27 May 1958 by which time the USN had ordered a competitor from Chance Vought, both as insurance against technical failure and to examine a different solution to its staff requirement. The single-engined, single-seat XF8U-3 Crusader III that emerged fell well short of the F4H's armament and radius of action and a USN preliminary evaluation confirmed the Phantom's superiority. In December 1958, 23 development and 24 production Phantoms were ordered in concurrent batches to hasten the aircraft into service. The risk that technical problems might affect the production aircraft was accepted but during the course of their development flying, F-4Hs proved to have such exceptional performance that the Navy decided to attempt a number of world records with them. Records for absolute height, time to various heights, 310 mile (500 km) and 62 mile (110 km) closed circuits, low altitude and absolute air speed records were all captured by production fighters literally off the flight line, although they were cleaned and polished first. The only modification was a water-injection system fitted in the aircraft that attained the absolute world air speed record which cooled the incoming air ahead of the compressors. The first operational Phantom unit was US Navy Squadron VF-101, the 'Grim Reapers', formed in 1960.

The US Air Force was impressed and evaluated Navy Phantoms with USAF pilots against a range of its own aircraft. The F-4H proved to be a better interceptor and carried a larger payload further than any aircraft in Tactical Air Command, TAC. It also had clear potential as a reconnaissance aircraft and demonstrated better serviceability, in terms of man-hours per flying hour, than any of the aircraft it was evaluated against. It was adopted with high priority to become the principle aircraft for TAC and was initially given the USAF designation F-110A. This caused confusion with politicians arguing publicly over the relative merits of the F-4H and F-110. Consequently a standardised Department of Defence designation system was introduced for all US armed forces in 1962. The Phantom was re-designated as the F-4 with the early versions used by the USN and USMC designated F-4A and F-4B; the first USAF variant was the F-4C, a minimal change derivative of the 'B'.

THE CONTEMPORARY SOVIET THREAT

Concerned by the obvious capability of the NATO carrier strike fleet, the Soviet Union developed and deployed a range of anti-surface vessel missiles from the late 1950s. The Tupolev Tu-16B 'Badger' bomber operated by the Soviet Naval Air Force, the AV-MF had a radius of action of about 1,150 nm carrying two 'Kennel' turbojet-powered anti-ship missiles under its wings. After launch they received mid-course guidance from the Badger's radar and then used their own radar for terminal guidance but could not discriminate between contacts, locking onto the first target detected which might, or might not, be the intended victim. Depending on their height of release, 'Kennels' had a range of about 100 miles and a conventional warhead equivalent to a 1,000lb bomb.

From 1955 the RN evaluated tactics to counter stand-off missiles, using USAF and RAF high-level bombers with carrier-borne fighters simulating

RN F-4K '007' launching from the waist catapult of ARK ROYAL.

their missiles. In line with the latest intelligence assessments about Soviet tactics, the bombers attacked using 'regiments' of 12 aircraft in a stream intended to swamp task force defences in one segment. The problem of fleet air defence against faster Soviet bombers with longer-range missiles predicted by intelligence communities in the UK and USA, was studied at the RN Tactical School ashore. Interception evaluations by the Home Fleet demonstrated, unsurprisingly, that Sea Hawk and Sea Venom fighters lacked the performance to defeat regimental attacks and that air-to-air missiles would need to replace guns in all future fighters. A series of naval staff requirements defined the type of fighter the fleet would need from the mid 1960s. The Scimitar and Sea Vixen were already being developed but both were subsonic and, while capable of engaging 'Badgers' and the larger 'Bears' with success, they lacked the ability to defeat the new generation of supersonic bombers the Soviets were believed to be developing.

A USN F-4J next to a RN F-4K about to launch from the USS INDEPENDENCE in 1971 during a cross decking exercise. Note the elevated nose/pitch of the RN version. This was to provide a better angle of attack for launching from the RN's shorter steam catapult length.

DISPARATE STRIKE FIGHTER REQUIREMENTS AND INEPT POLITICIANS

Based on intelligence assessments of the future threat, the Admiralty's Directorate of Naval Air Warfare, DNAW, stated that the Sea Vixen replacement must be able to 'intercept and destroy a bomber closing at a speed of Mach 2.5 at 65,000 feet' in all weathers. Armament was to be four Red Top infra-red homing guided missiles at first, with a British radar-guided missiles known at the time as GDA 103(T) to be added later. Given these key parameters, the aircraft was to have 'adequate performance against low and slow targets in an electronic countermeasure environment' and was to be capable of loitering on CAP for 2.5 hours at 100 nm from the carrier, carrying out an interception with five minutes at full power at the end of that time if necessary before returning to the ship with adequate fuel for one overshoot. Supersonic performance was necessary to reposition against a threat detected on the far side of the task force by AEW aircraft and to intercept as far from the task force as possible. In the strike role the aircraft was to carry a 4,000lb bomb load, including a nuclear weapon, over the best radius of action possible given the engines and fuel designed for the primary mission with a 100nm dash to and from the target at very low level at Mach 0.92. Short take-off and landing performance was built into the Navy's carriers so there was no need to specify it but the Admiralty was happy to accept it as part of a joint aircraft specification provided that it did not degrade the overall performance. Even given the rapid advances in aircraft technology since 1945, this specification was a big ask.

The RAF was required to defend the UK against attacks by similar Soviet aircraft and a joint staff requirement was agreed with the Admiralty. The competitive evaluation of a number of designs led to the selection of the revolutionary Saunders-Roe SR-177 rocket/turbojet-powered fighter, to be built to an agreed common design with significant concessions by both partners. A concept-development precursor, the SR-53, demonstrated a top speed of Mach 2.1 at 60,000 feet and 'electrifying" turning performance at high level; the SR-177 was expected to exceed Mach 2.5 with an even more remarkable turning performance. The prototype of what might have become a British joint strike fighter was nearly complete in 1957 when the Defence Secretary, Duncan Sandys, cancelled the project on his own initiative against the advice of his Service and procurement chiefs because he believed that fighters were obsolete and that the future lay with guided missiles. The situation was made even worse by his successor, Peter Thorneycroft, who dictated that a Hawker project, the P-1154, designed to meet NATO basic military requirement number 3, NBMR-3, for a short-range, VTOL attack aircraft must form the basis for a new strike fighter to replace the RN Sea Vixen FAW 2 and the RAF Hunter FGA 9. Mesmerised by the attitudes of his US equivalent, Robert S McNamara, a former chief executive of the Ford Motor Company, who forced through the development of the multi-Service, multi-role F-111 against professional advice as his concept of reducing the increasing cost of aircraft procurement, Thorneycroft imagined the P-1154 to be 'British F-111' and tolerated no argument against it. The F-111 itself was controversially expected to perform a number of missions ranging from strategic bombing, through tactical strike and reconnaissance to fleet air defence and was the first design to incorporate 'swing-wings' which proved to be difficult and expensive to perfect. Expensive delays and excessive aircraft weight forced the USN to leave the project and, while the problems were overcome, the USAF only bought a limited number rather than the large numbers originally intended. Eventually it became a successful strike aircraft that also served with the RAAF but it never came close to being the 'universal' joint strike fighter of McNamara's dreams

The RN and RAF were to have a joint P-1154 or, literally, nothing but the RN needed a twin-engined, high-flying, two-seater interceptor fighter with a large pulse-doppler radar and air-to-air guided weapons that could engage targets beyond visual range in all weathers by day and night. The RAF wanted a single-engined, single-seat, low-flying close support aircraft for use by day in a clear air mass and stuck doggedly to a very limited specification evolved from the previous experience of its Day Fighter Ground Attack (DFGA) community with little thought for the future. It required a close-support aircraft capable of vertical take-off and landing from a semi-prepared strip 'close to the front line'. No fighter weapons and no radar were specified but the aircraft was to be capable of carrying out a ground-controlled interception in visual flight conditions by day within 100 nm of its base with a nominal loiter capability at that range of about an hour. Weapons were to be delivered using a head-up display sight and a single F-95 camera and tape recorder were expected

An F-4K landing aboard ARK ROYAL for a touch and go.

Five F-4K Phantoms of NAS 892 lined up on ARK ROYAL.

to give the aircraft a reconnaissance capability. The only mandatory requirement was to be the ability 'to sustain Mach 1.7 at the tropopause' (the boundary in the Earth's atmosphere between the troposphere and the stratosphere). Reading through these statements of requirement fifty years later, it is impossible to imagine how even a politician could have expected a single design, especially one at the lower end of the capability spectrum to start with, to meet both requirements. The naive simplicity of the RAF requirement also stands out, given the increasing sophistication of Soviet anti-aircraft systems deployed into the forward edge of the NATO battle area and visual interception, even by day, had ceased to be viable. Fortunately for the UK, the F-4 provided the solution.

RN SELECTION OF THE F-4 PHANTOM II

Between 1961 and 1964 Hawker Siddeley struggled to offer more than 20% commonality between the two variants of the P-1154 while the Phantom entered US Navy and Marine Corps service, broke world records and was selected by the USAF to become a joint strike fighter. The P-1154 was crippled by its VTOL origins since, realistically, it had to be single-engined, carry the excess weight of its zero-speed hover controls and all-up weight needed to be less than the maximum thrust of its Bristol Siddeley BS-100 engine. The Admiralty cast envious eyes across the Atlantic; NBMR-3 came to nothing and in February 1964 the Government agreed to cancel the RN version of the P-1154 and procure 140 Phantoms direct from McDonnell at a cost originally estimated at £45 million for the first 60.

A Buccaneer strike bomber conducting a buddy refuel of an F-4k Phantom. ARK ROYAL embarked Phantoms, Buccaneers, and Gannet AEW&C as well as ASW rotary wing aircraft. Quite a potent at sea capability even by today's standards.

The obvious choice for the RN was the F-4J, an improved variant of the Phantom being developed for the US Navy and the largest British carriers, ARK ROYAL and EAGLE could have operated it; the smaller VICTORIOUS and HERMES would have been marginal. A new class of carriers had been authorised in 1963 but the first of these, to have been named QUEEN ELIZABETH, could not enter service until at least 1972. An F-4J with boundary layer control and other aerodynamic improvements would have been affordable and effective but politicians even managed to complicate what should have been a straightforward Phantom purchase.

Having done all it could to cancel British projects and run down the industry when it came into power, Harold Wilson's Labour Government now had a change of heart and insisted on British industrial participation. Rolls-Royce was desperate to get back into the fighter market and had proposed a Spey-engined Phantom in 1962. This now formed the basis of the RN variant, designated the F-4K. The pulse-doppler radar was built under licence by Ferranti, the cockpit instruments and other avionics were British; the outer wings were made by Shorts in Belfast and the rear fuselages and tail were made by the British Aircraft Corporation at Preston but all aircraft were assembled by McDonnell at St Louis. The re-heated Spey engine was unique to the British F-4 and caused considerable problems, delay and a massive increase in cost. They were heavier and wider but shorter than the J-79, requiring a complete re-design of the after fuselage and intakes that were 20% bigger than the US-engined aircraft to cope with the greater mass flow of air they required. These changes increased drag and gave lower performance than the F-4J. Engaging reheat caused problems and a special variant had to be developed; its nozzles were nearer the aircraft skin than those of the J-79 which meant that titanium had to be used extensively on the after fuselage, driving up cost still more. Other unique features included a unique nose-wheel with a 40 inch extension to allow aircraft to be launched at the optimum angle of attack from short British steam catapults, larger flaps with boundary layer control, drooped ailerons and an inverted slat on the leading edge of the tailplane. These increased weight and required strengthened undercarriages and tail-hooks. The unit cost was over twice that of an F-4J for an aircraft with lower performance.

The first RN Phantom arrived at the RN Fighter School at RNAS Yeovilton on 25 April 1968. There had originally been plans to commission five squadrons but after the QUEEN ELIZABETH was cancelled in 1966 the Government ran down the carrier force and reduced the order for F-4Ks to 52. Three naval air squadrons operated the Phantom, 700P the intensive flying trials unit, 767 the training unit based at Yeovilton and 892 which joined ARK ROYAL's air group as the RN's only front line unit. Despite early problems which included an engine life of only twenty hours between failures, the Phantom was a big improvement over the Sea Vixen and became more reliable. It was retired when ARK ROYAL was withdrawn from service in 1978. Twenty-eight of the 52 F-4Ks were diverted to the RAF, leaving only 24 to serve with the RN. The RAF 'K's formed a maritime unit tasked with the tactical air support of maritime operations, known as TASMO, based at an RAF base in Scotland. The USN expressed surprise that they were not used to form a second RN squadron for operation throughout the world from EAGLE but the Government failed to understand this rational approach, withdrew the ship from service and condemned the aircraft to a static existence shore. TASMO fighters sat

uselessly at their airfield during the Falklands War in 1982 since they had no means of getting to the scene of action.

The RAF version of the P-1154 was cancelled in 1965 and the RAF procured Phantoms designated F-4M. Having argued forcefully in 1961 that it did not want radar, two engines, air-to-air missiles and a second crew member when the Navy wanted them, it now argued that it could not do without them. Politicians failed to notice the change. Impressively, the British version of the Phantom replaced the Sea Vixen FAW 2, Lightning F-2 and F-3, Hunter FGA-9 and FR-10, Canberra B(I) 8, PR-3 and PR-7 in service with a quantum leap in performance over all of them.

IS TODAY'S JOINT STRIKE FIGHTER SIMILAR?

Yes and no. Like the Phantom, the Lightning II is becoming the benchmark design of its era but unlike it, today's joint strike fighter is a political creation that attempted to consolidate different requirements into a single aircraft, designated the F-35 since 2001, with three variants - the conventional F-35A for the USAF, the STOVL F-35B for the USMC, RN and RAF and the carrier-borne F-35C for the USN. Both the F-111 and the P-1154 had stressed land operations first with modifications to make them operable at sea. The Phantom was designed for seaborne use first and was simply the best at everything it did. Everyone wanted it and big production numbers drove down cost.The F-4 Phantom was the result of inspired design work by James McDonnell and his team that fortunately matured just before the era of ill-informed political involvement in the process of specification. Arguably, the F-35 was always going to be a complex and technically difficult aircraft to develop and early estimates proved over-confident and impossible to deliver. The requirement to incorporate STOVL capability into a common airframe has had a major impact on the other variants and without it, the USN and USAF variants would be very different, probably having two engines, the option of one or two crew members and more robust construction.

By 2014 many analysts had come to the conclusion that it would have been cheaper and quicker to develop two different types of aircraft rather than pursue the dream of a common airframe and they could well be right. The F-35B, however, is the only type that can replace the AV-8B in operation from American LHAs and LHDs and is, therefore, of critical importance to the US Marine Corps. It is also the only type that can operate from the new British Queen Elizabeth class as built. The USN, on the other hand, does not need the F-35C with anything like the same urgency. The type's defining role is stealthy strike against sophisticated air defence systems, a task for which unmanned combat air vehicles are beginning to show greater potential in the near future. If the USN unmanned carrier-launched strike and surveillance system, UCLASS, continues to get the urgent attention it is receiving now, the F-35C's operational life may be a short one since UCLASS will offer greater performance at significantly less cost. ■

HMS ARK ROYAL at sea with Phantoms and Buccaneers on her deck. When ARK ROYAL was decommissioned the Phantoms of the RN were sent ashore for good.

USN FRIGATES FADING

THE END APPROACHES FOR PERRY-CLASS FFGs (*)

By Richard R. Burgess

Originally designed as convoy escorts, the USN's Perry-class FFGs have been adapted to new roles. They are now the workhorses of the Navy's drug interdiction operations in the Caribbean and still provide a vital escort role for larger ships and carrier battle groups. While popular with several foreign navies, and despite being vital to current US operations the USN will retire the last FFG by 2020.

The once ubiquitous frigate soon will become a relic of the past for the USN. In 2013 alone, the service decommissioned seven Oliver Hazard Perry-class guided-missile frigates (FFGs), leaving just 15 in service out of a class that once numbered 51. Five more are slated for decommissioning in 2014, seven in 2015 and two in 2016. By 2020, when the last FFG is retired, the USN will be out of frigates.

The lead ship, OLIVER HAZARD PERRY, was commissioned in 1977, and the class typified the build up to a 600-ship Navy that was the goal during the administration of President Ronald Reagan. The 51 Perry FFGs helped the Navy reach a peak of 115 frigates in 1985. An additional 16 Perry FFGs were built for the navies of Australia (six), Spain (six) and Taiwan (eight).

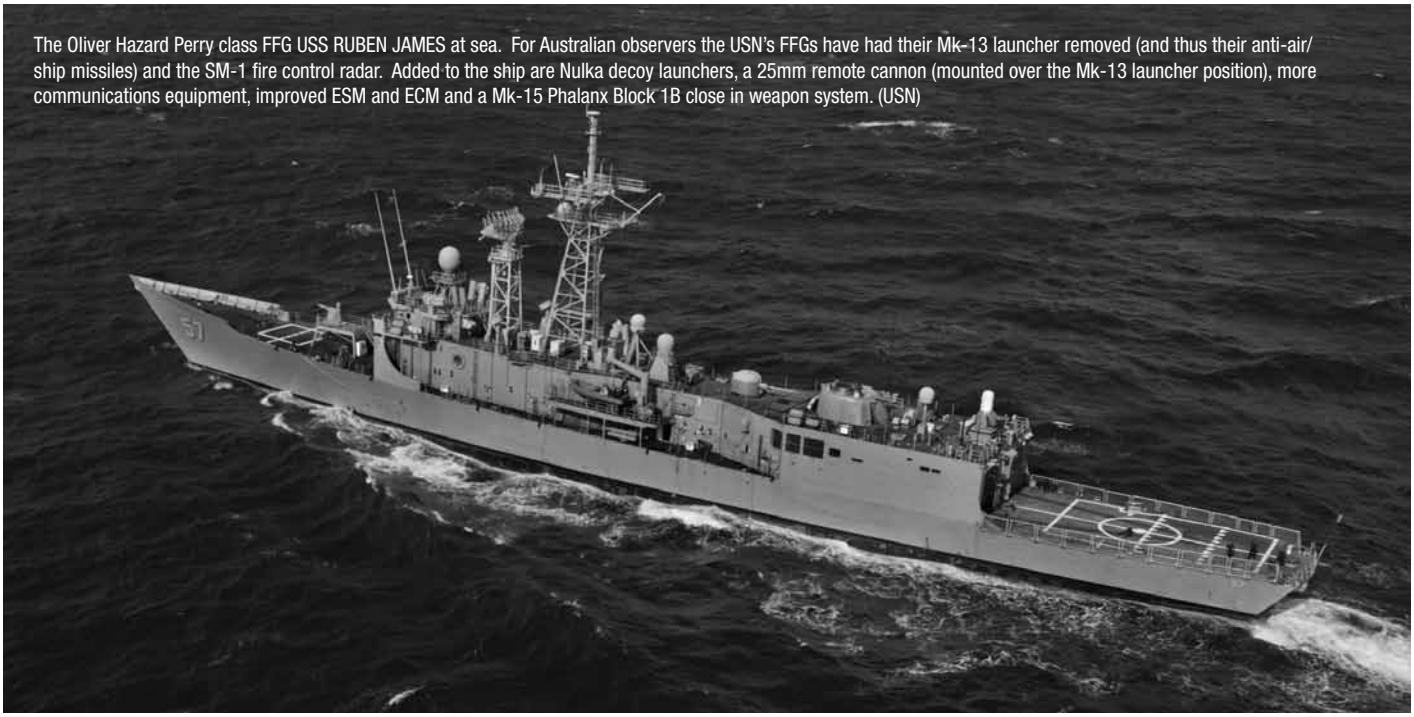
Prior to the advent of the Perry class, frigates were known as escort vessels, or "destroyer escorts." Bridged by the six-ship Brooke-class FFGs, the Perry ships also were built to escort convoys, auxiliary ships and amphibious warfare ships. But equipped with the Naval Tactical Data System, the Mk56 hull-mounted sonar, the Tactical Towed Array System, Standard SM-1 surface-to-air missiles, a rapid-fire Mk75 76mm gun and two SH-60B Seahawk anti-submarine (ASW) helicopters as the main component of the Light Airborne Multipurpose System, the Perry class was capable of many more missions.

Unlike other ASW ships, the Perry FFGs were not equipped with the ASROC (Anti-Submarine Rocket). To compensate, they were equipped with two SH-60Bs (or SH-2Gs in Reserve force frigates), which could drop Mk-46 ASW torpedoes on hostile submarines well over the horizon.

The Perry class represented a halt to the trend of the increasing size of frigates, said naval analyst Norman Polmar. Admiral Elmo Zumwalt, then-chief of naval operations, put a limit on the cost, size and crew size of the ship, which made them more affordable.

With the Standard Missile fired from the Mk-13 single-arm launcher and the two SH-60B Seahawk helicopters, the Perry FFGs "changed the paradigm of ASW escorts," Polmar said. Though not designed to, Perry FFGs deployed routinely with battle groups in the thick of the Cold War in the 1980s and afterward in the 1990s, when all previous classes of escort vessels were retired. Their capabilities also made them ideal for independent operations.

The Perry class also proved to be tough. In 1987, USS STARK survived a strike from two Exocet anti-ship missiles launched from an Iraqi aircraft, and in 1988 USS SAMUEL B. ROBERTS survived an encounter with an Iranian mine in the Persian Gulf.



The Oliver Hazard Perry class FFG USS RUBEN JAMES at sea. For Australian observers the USN's FFGs have had their Mk-13 launcher removed (and thus their anti-air/ship missiles) and the SM-1 fire control radar. Added to the ship are Nulka decoy launchers, a 25mm remote cannon (mounted over the Mk-13 launcher position), more communications equipment, improved ESM and ECM and a Mk-15 Phalanx Block 1B close in weapon system. (USN)

(From left) The FFG USS STEPHEN W. GROVES, the Ticonderoga class cruisers USS HUE CITY and USS SAN JACINTO and the Arleigh Burke class destroyers USS OSCAR AUSTIN and USS WINSTON S. CHURCHILL. The FFGs' speed, electronic warfare and ASW capability has made it a useful destroyer/cruiser escort. (USN)

Beginning in 2003, the USN began removing the Mk-13 launcher from the Perry class, intending to replace the Standard Missile with the Rolling Airframe Missile (RAM) system. The plan, however, was dropped for cost and the short remaining service life of the ships. On some ships, a 25mm Mk-38 rapid-fire chain gun was installed in its place. Although denuded of guided missiles, the "G" in the FFG designation remained unchanged.

"FFGs are the workhorses of the fleet," said Lt. Rick Chernitzer, a spokesman for commander, Naval Surface Forces, in San Diego. "Originally conceived as primarily an anti-submarine warfare platform, [they are] ideal platforms for deployments in support of counterpiracy, counternarcotics, presence, escort and protection-of-shipping operations.

"FFGs are particularly suited for conducting the counternarcotics mission," he said. "The most important aspect of any mission is the ability to detect threats or targets within a time frame that supports action. The use of embarked SH-60B helicopters expands the surveillance area to detect smugglers early.

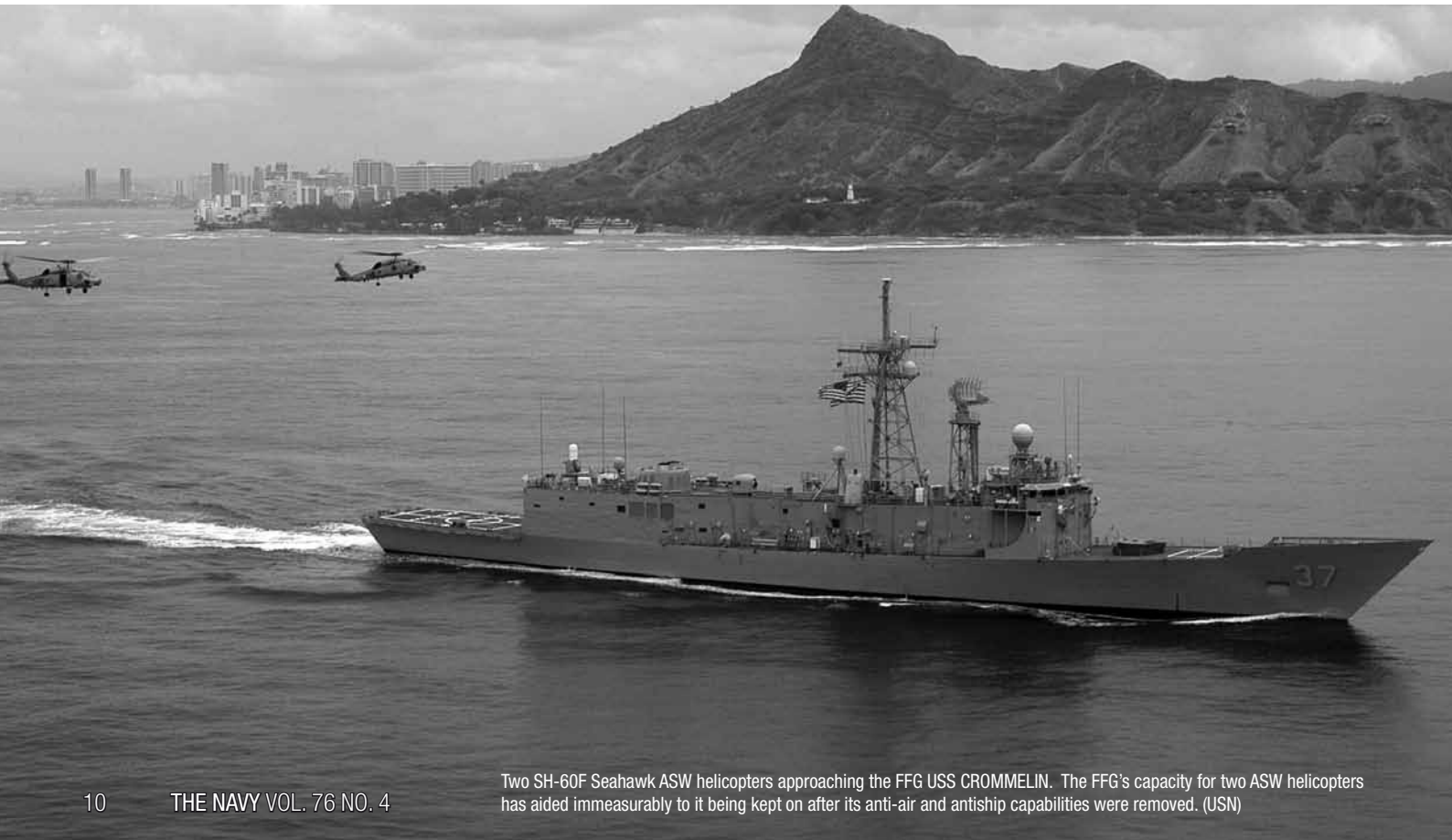
"FFGs have two hangars, a flight deck, maintenance spaces and living accommodations for an embarked helicopter detachment, allowing simultaneous aircraft operations and maintenance. This arrangement, coupled with the ability to offset maintenance cycles of the helicopters, can provide a more persistent aircraft availability and thereby maintain a more consistent and broad surveillance area while conducting at-sea operations," he said.

Chernitzer also noted that counternarcotics operations often require high-speed transits and close-quarter maneuvering to interdict illicit cargo.

"FFGs themselves are more efficient when operated at these elevated speeds," he said. "The maximum sustained speed [of a Perry FFG] is about 29 knots with a 4,200 nautical mile range at 20 knots. Efficiency directly translates in operational availability. The more efficiently the ship can utilize its fuel stores, the longer the ship can maintain station to conduct operations. Fuel efficiency is crucial when operating independently."

Frigates engaged in counternarcotics operations most often operate independently of underway replenishment vessels and must make port calls to refuel and take on supplies.

"The FFG's relatively smaller size and draft, compared to many naval vessels, paired with quick handling assisted by auxiliary propulsion units, make it adept in transiting remote littorals with minimal port assets such as tugs or pilots," Chernitzer said.



Two SH-60F Seahawk ASW helicopters approaching the FFG USS CROMMELIN. The FFG's capacity for two ASW helicopters has aided immeasurably to it being kept on after its anti-air and antiship capabilities were removed. (USN)

Perry-class FFGs also have led the way in deploying with the MQ-8B Fire Scout Vertical Takeoff Unmanned Aerial Vehicle (VTUAV). Deploying since 2009 with one SH-60B helicopter and two Fire Scouts or with four Fire Scouts, the ships have provided a high-endurance surveillance platform in support of U.S. Africa Command.

However, as with most aging military equipment, the three-decades-old Perry class is becoming more expensive to maintain and sustain.

"The accumulating deterioration of the ship's hull, propulsion, auxiliary gear and combat systems over time has become exponentially more costly to repair," Chernitzer said. "Maintenance challenges, including understanding the older systems combined with missing or incomplete documentation, complicates and slows the process of troubleshooting, identifying correct parts and completing repairs.

"The Perry-class FFGs suffer from parts availability; very often parts are no longer in production or in scarce supply," he said. "Many companies contracted to supply equipment at commissioning in the 1970s and 1980s are now out of business. Some parts are costly, whether to transfer from a decommissioned ship, purchase from a supplier or have specially manufactured."

Because of its size and capabilities, the Perry FFG has been popular as a second hand Foreign Military Sales items, having been purchased by the navies of five nations: Bahrain (one), Egypt (four), Pakistan (one), Poland (one) and Turkey (eight). The USN stands ready to transfer more as they are decommissioned. Taiwan has expressed an interest for more, and Mexico and Thailand also have indicated interest in acquiring Perry-class FFGs.

The Perry-class FFGs will have no direct replacements in the fleet, although in some aspects the new Freedom-class and Independence-class Littoral Combat Ships (LCSs) are scheduled to assume some of their roles with their anti-submarine and anti-surface capabilities. The LCSs also could prove to be ideal in adapting to counterpiracy and counternarcotics roles, as did the Perry class.

"LCS is currently envisioned to leverage the three mission packages [ASW, anti-surface warfare, mine countermeasures], but it's likely to evolve as need dictates," Chernitzer said.

The FFG USS RODNEY M. DAVIS (FFG-60) conducts a live-fire exercise of its MK-38 25mm remote controlled cannon. The cannon is located above the spot that was the Mk-13 single rail missile launcher. (USN)

Postscript: Since this article was written we have received the following from the author:

The USN now plans to retire all of the remaining Perry-class frigates, according to a recent internal naval message. Many of the ships will be made available for transfer to other navies under the Foreign Military Sales (FMS) programme.

The Perry-class frigates listed below will be decommissioned in 2015 and expected to made available for FMS acquisition:

USS MCCLUSKY (FFG-41), Jan. 14, FMS.

USS ELROD (FFG-55) Jan. 30, FMS.

USS RODNEY M. DAVIS (FFG-60) March 21, FMS.

A US Coast Guard Law Enforcement Detachment (LEDET) and the FFG USS INGRAHAM (FFG-61) are seen here during the intercept of 2,381 kilograms of cocaine worth more than US$107 million aboard a self-propelled semi-submersible craft in the Pacific Ocean off Central America during May this year. The USN has found the FFGs to be excellent counter narcotics platforms. (USN)

USS VANDEGRIFT (FFG-48), March 31, FMS.

USS TAYLOR (FFG-50), May 8, FMS.

USS GARY (FFG-51), Aug. 5, FMS.

USS SIMPSON (FFG-56), Aug. 14, FMS.

USS KAUFFMAN (FFG-59) Sep. 21, FMS.

Those that are to be scraped include the following:

USS SAMUEL B. ROBERTS (FFG-58) May 22,

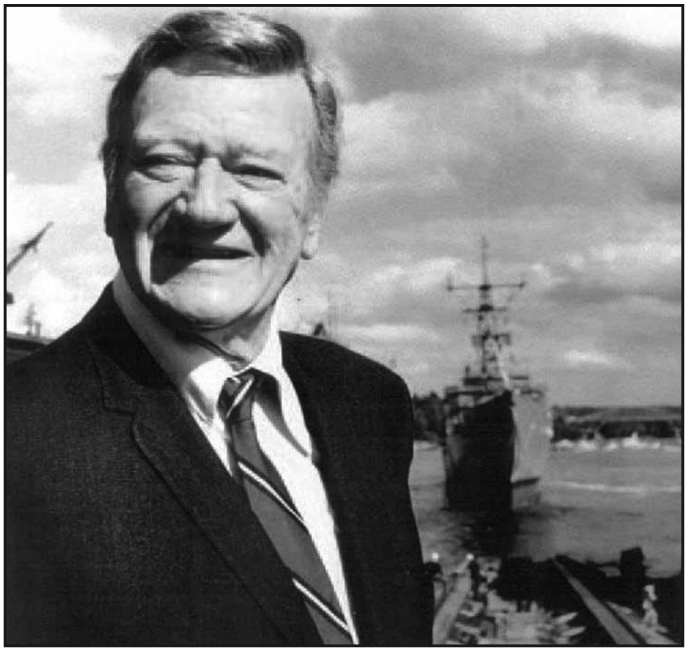
USS INGRAHAM (FFG-61), Jan. 30.

TRIVIA/FOLKLORE USS OLIVER HAZARD PERRY

The FFG-07 class was named after Commodore Oliver Hazard Perry, an American naval hero, who was victorious at the 1813 Battle of Lake Erie. Born in South Kingstown, Rhode Island, the son of USN Captain Christopher Raymond Perry and Sarah Wallace Alexander, Perry was a direct descendant of William Wallace. He was an older brother to Commodore Matthew Calbraith Perry who compelled the opening of Japan.

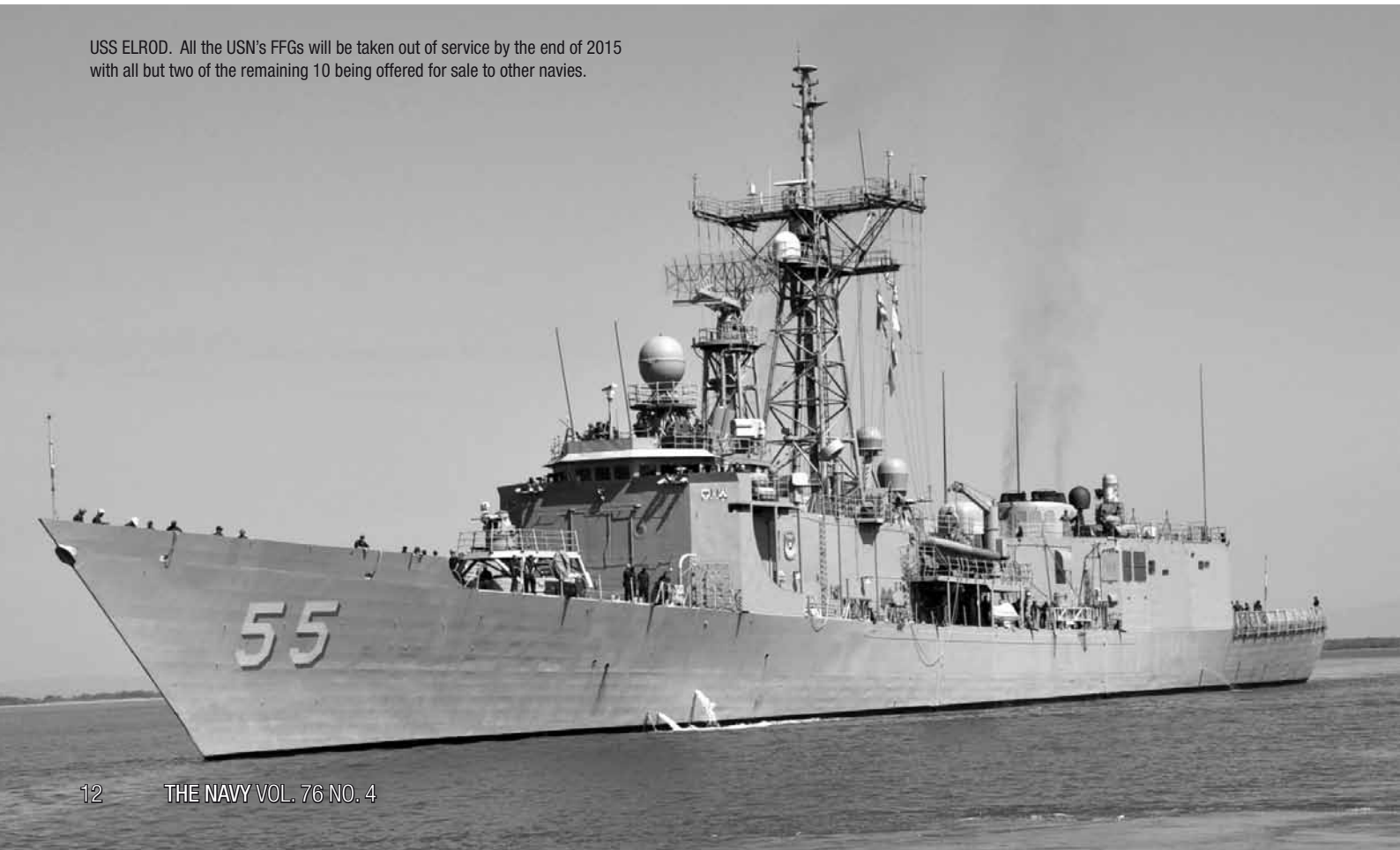
Perry served in the West Indies during the Quasi War with France, the Mediterranean during the Barbary Wars, the Caribbean fighting piracy and the slave trade, but is most noted for his heroic role in the War of 1812 during the Battle of Lake Erie. During the War of 1812 against Britain, Perry supervised the building of a fleet at Erie, Pennsylvania, at the age of 27. He earned the title “Hero of Lake Erie” for leading American forces in a decisive naval victory at the Battle of Lake Erie, receiving a Congressional Gold Medal and the Thanks of Congress. His leadership materially aided the successful outcomes of all nine Lake Erie military campaign victories, and the fleet victory was a turning point in the battle for the west in the War of 1812.

During the launch ceremony for the first FFG-07, USS OLIVER HAZARD PERRY, on 25 September 1976, the ship found herself briefly stuck on the slip-way. Film star John Wayne appeared from the crowd of watching dignitaries, climbed the launch ceremony platform, and gave the bow of the frigate - which was by this time starting to move slightly - a shove with one hand, and so John Wayne famously appeared to have ‘pushed’ a US warship down her slip-way and into history.



The then 70 year old screen legend John ‘The Duke’ Wayne at the launch of the first FFG, USS OLIVER HAZARD PERRY. It was arranged for the Duke to seen to push the ship down the slip way after the customary bottle of champagne was broken over her bow and the ship didn’t move.

(*) Reproduced with the kind permission from the Navy League of the United States magazine SEAPOWER.



USS ELROD. All the USN’s FFGs will be taken out of service by the end of 2015 with all but two of the remaining 10 being offered for sale to other navies.

01 LCM-1E UNDER TESTING

The RAN has taken delivery of the first four Spanish made LCM-1E tank landing craft for use from the new LHDs well dock. Four LCM-1E can be accommodated into each LHDs well dock as well as one in the well dock of the LSD HMAS CHOULES.

The LCM-1E is purpose built for the LHD and are intended to deliver troops and equipment onshore where there are no fixed port facilities. They have the ability to be used Over The Horizon, which means that the LCM-1E can transport between the ship and the coast starting at a distance greater than that marks the horizon, i.e. greater than 20 nautical miles (37 km). To perform this type of landing, the LCM-1E are equipped with radar navigation, GPS, gyro needle/magnetic and HF communications equipment, VHF and UHF. Propulsion consists of two MAN diesel engines of 806kW each connected to water jet propulsors (waterjets), offering a speed of 22 knots without load and 13.5 knots laden, with a range of 190nm (352km).

The LCM-1E incorporates a bow and stern ramp, facilitating the loading/unloading of rolling stock between LCM-1Es within the well dock of an LHD. Each LCM-1E can carry the Army's M1-A1 Abrams tank.

The watercraft will enable transport of troops and equipment from the LHDs to the shore including where there are no fixed port facilities.

The watercraft are currently undergoing test and evaluation.

CANBERRA ON FINAL SEA TRIALS

NUSHIP CANBERRA, the first of two Landing Helicopter Dock (LHD) ships being built for the Australian Defence Force, has sailed on her final contractor sea trials before an expected delivery to the Australian Government.

The ship departed Williamstown shipyard on 12 August as planned with the trials taking place in both Port Phillip Bay and off the southern coast of New South Wales before she returned to Williamstown around the end of August.

Final contractor trials involve testing of the combat and communication systems along with some platform systems trials.

Director of BAE Systems Maritime, Bill Saltzer, said: "This is the last major element of a very complex and comprehensive test programme to prove the capabilities of the ship and its systems prior to delivery to our customer.

"Getting this ship to this stage has been a collaborative effort between BAE Systems and the Defence Materiel Organisation (DMO). Our two project teams have worked closely throughout the project and now we are in the home stretch for the CANBERRA."

Aboard NUSHIP CANBERRA for the final contractor trials are BAE Systems and DMO project personnel along with a number of Royal Australian Navy (RAN) officers and sailors who will crew the ship once delivered, as well as BAE Systems subcontractors Navantia, Saab, L3 and Teekay.

The final trials also provide an ideal opportunity for a number of the crew to familiarise themselves with the ship following their training at the BAE Systems facility at Mascot, NSW, in which state-of-the-art simulation technology was developed and utilised to achieve technical competence in a cost-effective environment.

As well as demonstrating the ship's capabilities, the trials will provide the team with valuable feedback regarding the effectiveness of the training programme. The utilisation and extent of virtual training within LHD has been a new approach for the RAN and the feedback received from the crew so far has been very positive.

Mr Saltzer said work was also progressing well on NUSHIP CANBERRA's sister ship, NUSHIP ADELAIDE: "In shipbuilding, there are always lessons learned on the first ship of a new class that can be implemented to achieve higher levels of productivity on the following ship or ships and this is certainly the case with NUSHIP ADELAIDE. The second LHD is coming together rapidly and is on track to be ready to start sea trials in the second quarter of next year."

UK OPV ORDER TO SUSTAIN SHIPBUILDING SKILLS

The UK Ministry of Defence (MoD) has placed a £348 million contract with BAE Systems Maritime - Naval Ships for the construction of three new offshore patrol vessels (OPVs) for the RN.

All three ships are to be built at BAE Systems' Govan yard on the Clyde, Scotland. The move is thought to be politically motivated to save over 800 jobs and sustain key industrial capabilities between the end of the Queen Elizabeth-class aircraft carrier block build phase and the start of Type 26 frigate manufacturing later this decade. Remarkably the Australian Govt finds itself in the same position.

01 The first four Spanish built LCM-1E landing craft at Sydney's HMAS WATSON. (RAN)

The 12 August contract announcement follows on from the award in March this year of a £20 million long lead contract funding key items such as gearboxes and engines.
Plans to build the three 90 m ships, based on a proven OPV design already in service in Brazil and Thailand, were first announced in November 2013 as part of a wider restructuring package for the UK naval shipbuilding sector.
The first vessel is scheduled to be handed over to the RN in 2017, with all three to be delivered by the end of 2018.

INDONESIAN ATTACK CRAFT TEST C-705

The Indonesian Navy's (TNI-AL's) first two KCR-40-class attack craft, KRI CLURIT and KRI KUJANG, have completed sea acceptance tests of their Chinese C-705 surface-to-surface missiles' fire-control system. Each KCR-40-class vessel can carry up to four C-705 missiles.
According to a statement issued by the TNI-AL's Western Fleet Command (KOARMABAR) on 24 July, the tests, which included firing the missiles at a target, were carried out in the waters near Lingga Island, which is located about 200 km south of Singapore.
The TNI-AL has, however, stopped short of revealing further details of the fire-control system or the type of target engaged during these tests.
The C-705 is an anti-ship missile that bears resemblance to the C-602 (YJ-62) anti-ship missile, albeit smaller and lighter. The projectile has a maximum effective range of 140 km and is, in its basic version, guided by an active radar during its terminal stage. The C-705 is believed to be capable of carrying a 130 kg HE semi-armour piercing (SAP) directional warhead.

02 DDG-1000 ON TRACK

The DDG 1000 Zumwalt-class destroyer programme continues to progress, meeting key programme milestones on the path to Initial Operational Capability (IOC). As the prime mission systems integrator for the DDG 1000 ship class, Raytheon provides the multi-mission, integrated combat system capability for the programme.
"Progress on milestones continues for the three ships of the class, in labs, at test facilities and dockside at the shipyard – it's an exciting and rewarding time for the programme," said Raytheon's Kevin Peppe, vice president of Integrated Defense Systems' Seapower Capability Systems business area. "The collaboration between industry and the Navy has been outstanding, all moving forward with a common goal – to bring this transformational ship class to life."
Recent milestones include: Successful Test Readiness Review of Total Ship Computing Environment software, release 7. The 550,000 software lines of code – developed, integrated, tested, and delivered – build on the TSCE baseline of more than six million lines of code, and represent the first formal delivery to the ship that includes the combat system software as well as hull, mechanical, and electrical ship control functionality.
A production AN/SPY-3 Multi-Function Radar successfully tracked air targets for the first time at Wallops Island, VA. The SPY-3 array, receiver/exciter and signal/data processor were controlled by the combat system of the Self Defence Test Ship, exercising various search and track modes, including the new volume search. The radar tracked targets of opportunity and displayed targets and data on the DDG-1000 Common Display System.
Completion of the third session of instructor-led ship control systems training with members of the DDG 1000 pre-commissioning crew in Bath, Maine. More than 55 sailors have been trained on ship control systems to date; 85 sailors have attended TSCE operations training. Crew training continues, most recently with a session at Raytheon's Portsmouth, R.I. facility – in the company's Ship Mission Centre, a realistic replica of the crew's command centre.
Onsite at the shipyard, Raytheon's Ship Integration and Test team of experts continue to support ongoing installation, integration and test in-line with construction progress to meet Hull Mechanical & Electrical milestones and prepare for ship activation.
Since inception, Raytheon has delivered seven software releases totalling more than 6.5M software lines of code and containing less than 1 defect per 10,000 lines of code, well less than industry standard. This is a testament to the design and development approaches employed, which mitigate risks and mature technologies through phased and incremental testing.
The first ship, the future USS ZUMWALT (DDG-1000), is now more than 90% complete at the Bath Iron Works shipyard, Bath, Maine, and is supported by Raytheon's Ship Integration and Test team onsite for ongoing system integration and testing. DDG 1001 and DDG-1002, also under construction at Bath, are now 78 and 8 percent complete respectively.

02 NUSHIP ZUMWALT fitting out.

3A

THREE NUCLEAR SUBS FOR RUSSIA

It has been reported in the Russian media that Russia recently laid the keels of three new nuclear submarines to celebrate Russian Navy Day on 27 July.

The boats laid down are reported to be the fifth Dolgoruky (Borey)-class (Project 955A) nuclear powered ballistic missile submarine (SSBN) KNYAZ OLEG and the fourth and fifth Severodvinsk (Yasen)-class nuclear-powered attack submarines (SSNs) (Project 885M) KHABAROVSK and KRASNOYARSK.

"These ships in the coming decades will be the basis of the Navy and are guaranteed to provide [the necessary] defence capabilities and security for our country," Deputy Defence Minister Yuri Borisov told reporters at the Sevmash naval dockyard in Severodvinsk.

Deputy Prime Minister Dmitri Rogozin, who also attended, said: "The Borey-class and Yasen-class constitute the core of the Navy, which is now up to date and on schedule. We know that the presence of nuclear capabilities cool the ardour of any aggressor, anywhere in the world."

According to the Government, Russia's Navy is scheduled to have eight Borey-class SSBNs, five of which will be of the improved Project 955A version.

It is interesting to note that the current proliferation in submarine construction has not been seen since the height of the Cold War.

The other Russian nuclear powered submarines in construction or on trials are the Borey-class SSBNs VLADIMIR MONOMACH (which completed the first stage of state sea trials on 25 July) and KNYZ VLADIMIR , and the Yasen-class SSNs KAZAN and NOVOSIBIRSK.

Most of the submarines are expected to be based with the Northern Fleet, where in Soviet times two-thirds of Russia's nuclear boats were stationed, with the rest in the Pacific Fleet.

TWO TARANTUL V CORVETTES FOR VIETNAM

The People's Army of Vietnam (PAVN) Navy recently took delivery of two Tarantul V (Project 1241.8)-class guided-missile corvettes on 27 June, according to reports from state-sponsored Vietnamese media.

The 59.9 m vessels were manufactured by Ho Chi Minh City-based Ba Son Shipyard.

The Project 1241.8 boats are armed with one 76 mm main gun and two six-barrelled AK-630 gun mountings that act as the vessels' close-in weapon systems (CIWS). The boats are also equipped with 16 quad-launched SS-N-25 (Kh 35 Uran) surface-to-surface missiles (SSMs) and SA-N-5 Grail surface-to-air missiles (SAMs).

The boats have a top speed of 36 kt and can attain a standard range of 2000 n miles at 20 kt.

03 TWO NEW SHIP CLASSES FOR IN DELIVERED

The Indian Navy (IN) has recently taken delivery of two new classes of warship. A Kamorta class ASW corvette and a Kolkata class Project 15A guided-missile destroyer. Both are the lead ship of their new classes.

On 12 July the Indian Navy took delivery of its first Kamorta (Project 28)-class anti-submarine warfare (ASW) corvette.

The vessel's armaments includes an Oto Melara 76/62 Super Rapid Gun, two AK-630M close-in weapon systems (CIWS), and improved versions of the Russian RBU-6000 rocket launchers and DTA-53 533 mm twin torpedo launchers.

The 109m corvette is also equipped with a bow-mounted HUMSA-NG sonar and towed-array system linked to an IAC Mod C fire-control system for submarine prosecution. Other sensors include Bharat's Revathi 3-D E/F-band radar system for surveillance and BEL Lynx U1 directors for fire control.

Powered by four Pielstick 12PA 6 STC6 engines, the 3100-tonne vessel can reach a maximum speed of about 25kts with a range of 4000nms at a speed of 12kts. The corvette can carry one Ka-28PL or HAL Dhruv helicopter on its deck.

The Indian Navy was expected to operate up to 12 vessels in class. However, only four vessels have been confirmed. Three other corvettes are now under various stages of construction at GRSE's facilities in KOLKATA.

The next class to be delivered, INS KOLKATA, is the first of three locally designed and built 7,400-tonne Project 15A guided-missile destroyers. It was delivered on 16 August in Mumbai.

Two follow-on warships - KOCHI and CHENNAI - are also under construction at Mumbai's Mazagaon Dockyard Limited and will be commissioned at eight-month intervals.

Manned by a 325-strong crew, including 30 officers, KOLKATA has an operating range of 15,000km and is armed with vertical launched BrahMos supersonic cruise missiles, a licence-built 76mm Oto Melara Super Rapid gun, and four Russian AK-630 close-in weapon systems.

3A - 3B 4A - INS KAMORTA, the first of the Kamorta class ASW corvettes, on sea trials. (IN). 4B - INS KOLKATA, the first Kolkata class Project 15A guided-missile destroyer, on sea trials. (IN)

Its Israeli made Barak Next-Generation (NG) long-range surface-to-air missiles are still awaiting delivery however, the associated multi-mission guidance radar - the IAI-Elta EL/M-2248 MF-STAR and EL/M-2238 L-band STAR surveillance radar - have been installed, as has a Thales LW-08 D-band air search radar.

KOLKATA's anti-submarine warfare capability comprises indigenously developed twin-tube torpedo launchers, RBU-6000 SMERCH-2 rocket launchers, and the Hull Mounted Sonar Array-Next Generation, a low frequency Advanced Towed Array Sonar system from Germany's Atlas Electronix will be fitted when the system becomes available. The locally designed CMS-15A combat management system integrates all the weapon systems and sensors. KOLKATA's flight deck and enclosed hanger are capable of embarking two multirole helicopters.

04 RAN MH-60R FIRES FIRST HELLFIRE

The RAN has completed its first test firings of the AGM-114 Hellfire air-to-surface missile from its new MH-60R Seahawk maritime helicopter.

The test firings were conducted at the USN's Atlantic Undersea Test and Evaluation Centre (AUTEC) range near the Andros Islands in the Bahamas.

Australia has purchased 24 MH-60R helicopters under Project AIR 9000 Phase 8, valued at $3.2 billion, to replace its 16 S-70B-2 Seahawk in anti-submarine warfare (ASW) and anti-surface warfare (ASuW) roles.

SAAB BUY KOCKUMS

Swedish company Saab announced on 22 July that it had completed the AUD$51 million purchase of Swedish shipyard ThyssenKrupp Marine Systems AB (TKMS AB formerly Kockums) from German industrial group ThyssenKrupp.

The business is to be be re-named Saab Kockums and become a business unit within Saab's Security and Defence Solutions division. The deal value is some way below previously reported estimates, which had suggested Saab expected to pay around AUD$160 million for the company.

The acquisition is the result of a decision by the Swedish government to revive its sovereign submarine building capability to deliver its next generation submarine. Sweden had originally planned to work with TKMS to develop the next-generation A 26 submarine. However, Sweden's government and TKMS were unable to resolve differences over TKMS export strategy for the platform.

05 THE SUN SETS ON CHIEF OF NAVY'S TIME IN COMMAND

Former Chief of Navy (CN) Vice Admiral Ray Griggs AO, CSC, RAN went to sea for the last time as Chief of Navy onboard HMAS ARUNTA, just as the ship has achieved a significant milestone with the completion of the Anti-Ship Missile Defence Upgrade Programme and before his promotion to Vice Chief of the Australian Defence Force.

Sailing overnight in the second of the eight Anzac class frigates to complete the upgrade enabled VADM Griggs to revisit a ship he commanded over 12 years prior. Whilst the layout of the ship was familiar to him, a tour including the two deck passageway, quarter deck, machinery control room and bridge highlighted the changes that have been made during the upgrade.

VADM Griggs also talked to ship's company whilst enjoying a cake baked by the onboard chefs, viewed and participated in a surface warfare serial, observed a silent hours emergency response team exercise and assistant principal warfare officer training.

As the sun set in the West Australian Exercise Area, VADM Griggs reflected on his time in command of the RAN.

"I have been so humbled to lead an organisation of amazing men and women. Together we have had three years of significant change, challenges and achievements," said VADM Griggs.

"I am most proud of the progress we have made with cultural reform associated with New Generation Navy, development of the seaworthiness management system, implementation of the Rizzo Report recommendations and of course the spectacular success of the International Fleet Review"

"I would like to thank all of you for your support as we have moved Navy forward, and I want you to pass on my thanks too, to your family, without their support none of us could achieve all that we do."

VADM Griggs' visit to ARUNTA coincided with their sea qualification trials following the Anti-Ship Missile Upgrade. During the last eighteen months every compartment within ARUNTA has been affected with more than 30,000 metres of fibre optic cabling laid. A substantial maintenance package was also

04 NUSQN 725 Operations Officer LCDR Nigel Rowan conducts pre-flight checks on the 'Hellfire' prior to the first launch from the MH-60R Seahawk 'Romeo', in Florida, USA. (RAN)

05 VADM Ray Griggs on HMAS ARUNTA for the last time as Chief of Navy. (RAN)

completed to ensure compliance with the tenets of seaworthiness.

Vice Admiral Griggs has particular interest in visiting ARUNTA in his last week as Chief of Navy as he was Commanding Officer 2001-2002 in which time she deployed as part of Operation RELEX, to the Middle East Area of Operations, and was awarded the Duke of Gloucester's Cup for being the most operationally efficient ship in the RAN fleet for 2002.

VADM Griggs was succeeded by VADM Tim Barrett AO, CSC, RAN as the new Chief of Navy. By LEUT Kara Wansbury (RAN)

06 FREMANTLE TORPEDO RETURNED

Fremantle's famous torpedo memorial was returned to Monument Hill following restoration work carried out by the Royal Australian Navy and the City of Fremantle.

The restoration was carried out by Fleet Support Unit – West, based at HMAS STIRLING, and included repair work and painting of the torpedo while the new support base was being built.

The City, in conjunction with the Ex-services Alliance and heritage architects, developed a new support system for the WWII torpedo. The new support will ensure its longevity as a lasting monument to US Submariners stationed in Fremantle and who died during World War II.

Eleven US submarines were reported sunk or lost out of Fremantle from the total of 123 stationed there. Fremantle was also a major base for British and Dutch Submarines and thought to be the largest submarine base in the southern hemisphere at the time.

The memorial was originally erected by the City of Fremantle and the US Submariners Association in 1967.

ADF CLOSER TO AMPHIBIOUS FUTURE AT CLOSE OF RIMPAC 2014

More than 800 Australian Navy, Army and Air Force personnel are home after taking part in RIMPAC, the world's largest naval exercise, which concluded in Hawaii.

Australia sent the replenishment vessel HMAS SUCCESS and submarine HMAS SHEEAN, a rifle company from 5th Battalion, the Royal Australian Regiment and three RAAF AP-3C Orion aircraft to the exercise to conduct military training with defence forces from 21 other Pacific Rim nations.

At the start of the exercise on 26 June, Australian Defence Force officers were appointed to three senior RIMPAC command positions for the first time.

Rear Admiral (RADM) Simon Cullen served as Deputy Commander of the Combined Task Force, Air Commodore Chris Westwood as Combined Forces Air Component Commander and Commodore Peter Leavy as Expeditionary Strike Group Commander.

RADM Cullen said the experience gained by the Australian Defence Force (ADF) in leading the Expeditionary Strike Group would prove invaluable when the nation's new Canberra Class Landing Helicopter Dock (LHD) ships are introduced into service later this year.

"Having men and women from the Navy, Army and Air Force command this large, multinational amphibious task group at RIMPAC has greatly expanded the depth of knowledge and experience we have – not only operating in and around large ships, such as the US Navy's Amphibious Assault Vessels and our incoming LHDs, but also coordinating ground forces and air assets to achieve operational and humanitarian objectives," RADM Cullen said.

To further enhance Australia's amphibious capabilities, infantry soldiers from the Australian Army's 1st Brigade conducted amphibious focused training with soldiers and marines from across the Pacific.

The training covered a range of combat skills and culminated in a major amphibious landing and beach assault serial, launched from the United States Navy's Amphibious Assault Ship USS PELELIU.

HMAS SHEEAN and the three RAAF AP-3C Orion aircraft participated in multi-national anti-submarine warfare scenarios, while HMAS SUCCESS played a major role in the RIMPAC Replenishment Task Force by refueling the fleet of coalition warships and allowing them to stay involved in the exercise missions.

Chief of Joint Operations, Vice Admiral (VADM) David Johnston, said operational capability would be greatly enhanced by the ADF's participation at RIMPAC.

"We have already seen a real-world scenario this year in the Pacific region which demonstrated that cooperation amongst a large group of partner nations is sometimes crucial to conduct a mission that would be an insurmountable task for an individual nation," VADM Johnston said.

"The search for Malaysian Airlines Flight MH-370 covered an enormous search area which was only possible because a group of nations, all participating in RIMPAC, operated together with a common goal.

06 Workers coordinate the placement of the Fremantle Torpedo which was returned to its location at the Monument Hill Memorial, where it sits in memory of the US Submariners who were stationed in Fremantle during World War II. (RAN)

"Exercises like this give us an opportunity to refine and enhance our interoperability with each other, so we can work efficiently and effectively together when real situations arise."

RIMPAC is a biennial military training exercise conducted to strengthen international maritime partnerships, enhance interoperability and improve the readiness of participating forces for a wide range of potential operations.

This year marked the 24th RIMPAC and Australia has participated in every iteration of the exercise since it began in 1971.

by LEUT Sarah West RAN

07 EM RAILGUNS ON USS MILLINOCKET

The US Office of Naval Research (ONR) has integrated two prototype electro-magnetic (EM) railgun weapons on the joint high-speed vessel (JHSV) USS MILLINOCKET, at the Naval Base San Diego.

Until now, the prototypes had been tested and fired in a lab setting.

Scheduled for testing in a maritime environment in 2016, the prototypes, developed by BAE Systems and General Atomics, will undergo at-sea demonstrations, marking a significant step forward in naval combat for the USN.

Launched at high velocities to accomplish greater ranges than traditional guns, the projectiles sustain sufficient kinetic energy, while eliminating the requirement of a high explosive payload when they reach the target. Each projectile costs approximately $25,000, which is 100 times less than a traditional missile.

EM weapons, which are capable of firing a projectile at seven times the speed of sound (5,000mph) at a range of up to 110nm, use an electromagnetic force called the Lorenz Force to rapidly accelerate and launch a projectile between two conductive rails.

Furthermore, they can deal with multiple threats, including enemy warships, small boats, aircraft, missiles and land-based targets.

Railguns, which complement the existing kinetic weapons, are activated only when an electrical pulse is sent across metal rails to create an electromagnetic force.

RIMPAC SINKEX SUCCESS

The Royal Brunei Navy (RBN) has successfully fired two anti-ship missiles at an ex-US Navy (USN) ship during the sinking exercise (SINKEX) phase of the 2014 Rim of the Pacific (RIMPAC) exercise.

With the RBN making its debut at RIMPAC, its offshore patrol vessels KDB DARUSSALAM and KDB DARULAMAN fired two Exocet MM-40 Block 3 missiles at a decommissioned landing ship tank vessel, the former USS TUSCALOOSA (LST-1187), located 57nm northwest of Kauai on 14 July.

The live-fire event to sink the decommissioned Newport-class LST was part of a drill that included the participation of several nations and the use of a number of different anti-ship munitions: a P-3 maritime patrol aircraft from Japan's Maritime Self Defense Force, firing the ATM-84 Harpoon; a USN P-8 MPA from Maritime Patrol Squadron 45, firing a Harpoon RGM-84D missile; a CF-18 Hornet aircraft from the Royal Canadian Air Force's 409th Fighter Squadron, firing a GBU-12 dual-mode laser guided bomb; and an F/A-18 Hornet from the USN's Carrier Air Wing Two, firing the laser-guided Joint Direct Attack Munition GBU-54.

According to the USN, TUSCALOOSA sank around 1215 local time in 15,000 feet of water.

The sinking marked the second element of the SINKEX phase during RIMPAC 2014. A previous SINKEX on 10 July saw participating navies sink the the decommissioned USN Austin-class amphibious transport dock ship the former USS OGDEN (LPD-5), about 55nm northwest of Kauai. This element involved a Republic of Korea Navy submarine firing the UTM-84 Harpoon Missile; the Norwegian frigate HNoMS FRIDTJOF NANSEN firing its Naval Strike Missile as well as an Evolved SeaSparrow Missile; the USN Ticonderoga-class cruiser USS CHOSIN (CG-65) firing the RGM-84D Harpoon; B-52s from the US Air Force's 5th Bomb Wing dropping the GBU-12; US Marine Corps F/A-18 Hornets firing the Mk-82 general purpose bomb and GBU-12; and P-3 aircraft from the USN Patrol and Reconnaissance Wing Two's Patrol Squadron 1 (VP-1) and F/A-18s from the USN's Carrier Air Wing Two firing the AGM-88 High Speed Anti-Radiation Missile, AGM-84 Harpoon, and AGM-65 Maverick air-to-surface tactical missile.

Both SINKEX elements utilised the US Pacific Missile Range Facility in Kauai.

07 One of the two EM Railguns to be fitted to USS MILLINOCKET for testing on display on the flight deck. (USN)

HMAS BUNDABERG TO BE WRITTEN OFF

It has been reported in the main stream media, but at the time of printing not confirmed by the RAN, that the Armidale class patrol boat HMAS BUNDABERG will be written off after being gutted by fire on 11 August.

The patrol boat is one of 14 Armidale-class vessels used by navy and reportedly costs approximately $35 million.

BUNDABERG was undergoing extensive maintenance in at Brisbane's Aluminium Boats Australia shipyard when the fire erupted. It is believed the vessel was insured while in maintenance.

Teams from the Queensland Fire Brigade battled for four hours to get the intense fire under control.

Two civilian contractors were treated for smoke inhalation while other civilian and naval personnel were safelyevacuated.

The Abbott government is considering several options to fill the gap left by the patrol boats early demise but is yet to make an announcement.

08 HMS QUEEN ELIZABETH TAKES TO THE WATER

Britain's biggest ever warship HMS QUEEN ELIZABETH took to the water for the first time on 17 July as she was moved out of dry dock.

With just two metres to spare at either side of the 65,000-tonne aircraft carrier, a flotilla of tugs inched the ship from the dock where she was constructed at Rosyth, near Edinburgh, to a neighbouring jetty where she'll be completed over the next two years.

It took just three hours to complete the 'float out' – an operation which took place 13 days after Her Majesty the Queen officially named the vessel in a spectacular ceremony.

The ceremony, held at Rosyth dockyard near Edinburgh, marked the completion of the build which is the largest warship built for the Royal Navy:

- With a height of 56 metres she is taller than Niagara falls;
- At 280 metres long she has a flight deck the size of 60 tennis courts;
- Four jumbo jets could fit alongside each other on the 70 metre wide deck;
- Her range is 10,000 nautical miles and she carries enough fuel to transport a family car to the moon and back twelve times;
- She is fitted with a long range 3D radar that is capable of tracking more than 1,000 targets at once or can spot a tennis ball travelling at 2,000 miles per hour.

The construction of HMS QUEEN ELIZABETH has sustained around 8,000 jobs at more than 100 companies across the UK. Blocks of the ship were manufactured at six yards in Devon, Rosyth, Portsmouth and on the Clyde and Tyne before being assembled in Rosyth.

HMS QUEEN ELIZABETH is the first warship to be christened by Her Majesty in 15 years. To honour the ship's birthplace in Scotland, a bottle of Islay whisky from the first distillery the Queen visited was smashed against the bow.

Teams will now continue to outfit the ship and bring her systems to life in preparation for sea trials in 2016.

The dock she vacates will be used for final assembly of her sister ship, HMS PRINCE OF WALES, which will begin in September.

Both ships are being built by the Aircraft Carrier Alliance, a unique partnership between the Ministry of Defence, BAE Systems, Babcock and Thales.

EW CAPABILITY FITTED TO FIRST AWD

The Air Warfare Destroyer (AWD) Alliance successfully fitted the first Electronic Warfare (EW) antenna on top of the mast of the future guided missile destroyer HOBART on 6 August, making it the highest point on the ship.

The Antenna is part of the ITT–EDO Reconnaissance and Surveillance Systems Inc EW solution based upon equipment used by several navies from around the world. The equipment includes the ITT ES-3701-02S system for the detection and identification of radars, and the Southwest Research Institute MBS-567A system for intercepting communication signals.

The location of the antenna is significant as the height provides the range advantage - enabling the Royal Australian Navy to identify threats at the horizon.

"This state-of-the-art EW system is a critical capability for the Navy," said Commodore Steve Tiffen, General Manager of Stakeholder Engagement in the AWD Alliance.

"It is a passive system that is able to distinguish between friendly, neutral and hostile threats within seconds."

"This particular EW system, which is also being fitted onto the LHD and Anzac class ships, will significantly improve the Navy's tactical advantage, by increasing the distance from which threats can be detected."

"The EW system expands the types of threats that can be detected to encompass the most modern types of radar and communications systems. This will ultimately allow for more time for the crew to react and improve their ability to control the battlespace," Commodore Tiffen said.

The EW system contributes to the overall

08 HMS ILLUSTRIOUS (left) next to QUEEN ELIZABETH just prior to the latter's naming ceremony and eventual float out. (Aircraft Carrier Alliance)

defensive ability of the ship, by providing threat and situational information to the overarching tactical picture, and enabling the control and launch of off-board countermeasures, including the Nulka decoy, which is used to defend the ship against anti-ship missiles.
The increased situational awareness also supports the earlier engagement of threats with the AWD's weapons, providing an important tactical advantage.

KEEL LAID FOR THIRD 125 CLASS FRIGATE

The third of four F-125 class frigates for the German Navy was laid down during June at the Hamburg site of ThyssenKrupp Marine Systems, a company of ThyssenKrupp Industrial Solutions. The keel laying ceremony, attended by representatives from Government, defence and industry, marked an important milestone in the construction of the ship.
The first of the 125 class frigates was christened BADEN-WÜRTTEMBERG in December 2013 and was undocked as planned in Autumn this year. Delivery to the German Navy is scheduled for November 2016. The other frigates are being built one after the other, with the last of the four ships due for delivery in 2019. The contract is worth around 2 billion euros in total.
ThyssenKrupp Marine Systems heads the ARGE F125 consortium – which also includes Fr. Lürssen Werft – that was awarded the contract to build four F-125 class ships for the German Navy in 2007. The pre-fitted bow sections are being manufactured at the Fr. Lürssen Werft in Bremen and Wolgast. Construction of the stern sections, the joining of the two sections and further fitting out is being carried out at Blohm+Voss Shipyards in Hamburg.
The four F-125 class frigates will replace the German Navy's eight 122 Bremen class frigates. The ships were developed specially for current and future mission scenarios. In addition to the traditional tasks of national and alliance defence, the 125 class frigates are designed for conflict prevention, crisis management as well as international intervention and stabilization missions. The ships are capable of remaining at sea for 24 months and will be the first to implement the intensive use principle, i.e. significantly enhanced availability in the area of operation. This capability is supported by a reduced crew size and a two-crew strategy under which the crew can be swapped out on location.

09 11TH VIRGINIA DELIVERED

The US Navy accepted delivery of PCU NORTH DAKOTA (SSN-784), the 11th ship of the Virginia Class, on Aug. 29, two days prior to its contract delivery date.
NORTH DAKOTA is the first of eight Virginia class Block III ships. Approximately 20 percent of NORTH DAKOTA was redesigned as part of the Virginia Cost Reduction work done to lower acquisition cost and increase operational flexibility. The changes include a ship's bow redesign, replacing 12 individual launch tubes with two large-diameter Virginia Payload Tubes, each capable of launching six Tomahawk Cruise Missiles.
"NORTH DAKOTA delivered ahead of schedule and under budget," said Capt. David Goggins, Virginia Class programme manager. "When one considers the scope of design changes, this represents a tremendous achievement."
Only six days before delivery NORTH DAKOTA successfully completed Alpha, Bravo, and Board of Inspection and Survey (INSURV) trials, which evaluate the submarine's seaworthiness and operational capabilities. During the trials, the crew took the submarine to test depth, conducted an emergency surfacing, and tested the submarine's propulsion plant.
"NORTH DAKOTA and her crew delivered an outstanding performance," said Programme Executive Officer for Submarines Rear Adm. David C. Johnson. "It was almost 10 years ago that the first ship of the class, USS VIRGINIA delivered on Oct. 12, 2004. Since then, this programme has delivered 10 ships, with NORTH DAKOTA the latest. We continue to meet the Virginia class standard of delivering submarines early, under cost, more complete and ready for tasking right out of the shipyard. NORTH DAKOTA set a new benchmark for excellence in what is the arguably the best performing program in defence acquisition."
The US Navy postponed NORTH DAKOTA's original May commissioning date because of quality issues with vendor-assembled and delivered components that required an unplanned dry-docking to correct. Additional design certification work was also required on the submarine's redesigned bow.
"Now that certifications are complete, and we're armed with lessons learned, we can move forward knowing that we are providing our fleet with the most capable, and battle-ready submarine possible," said Goggins.

09 The PCU NORTH DAKOTA (SSN-784) during bravo sea trials. The crew performed exceptionally well on both alpha and bravo sea trials. The submarine NORTH DAKOTA is the 11th ship of the Virginia class. (USN)

NORTH DAKOTA will spend the next few months preparing for its Oct. 25 commissioning in Groton, Connecticut.

Virginia-class submarines are built to dominate the world's littoral and deep waters while conducting Anti-Submarine; Anti-Surface Ship; Strike; Special Operation Forces; Intelligence, Surveillance, and Reconnaissance; Irregular Warfare; and Mine Warfare missions. Their inherent stealth, endurance, firepower, and sensor suite directly enable them to support five of the six Maritime Strategy Core Capabilities - Sea Control, Power Projection, Forward Presence, Maritime Security, and Deterrence.

10 FINAL FLIGHT OF HUEY FOR 'RED DOGS'

After more than 40 years of service, the US Marine Corps retired the aging UH-1N Huey helicopter during a "sundown ceremony" on Aug. 28, 2014, aboard Naval Air Station Joint Reserve Base, New Orleans.

The UH-1N Huey is a twin engine, utility helicopter manufactured by Bell Helicopters in 1969. Bell began the delivery of 205 UH-1N helicopters, to the USN and USMC in 1971. For more than 40 years of service, the UH-1N has been operationally employed in Vietnam, Grenada, the Persian Gulf, Afghanistan and Iraq. The UH-1N flew its last combat flight in 2010 in Afghanistan.

"Over the years the Marine Corps has developed a number of upgrades for the aircraft including improved avionics, aircraft survivability equipment and a forward looking infrared sensor," said Maj. Joseph C. Begley, an AH-1W pilot with Marine Light Attack Helicopter Squadron 773 Detachment A, Marine Aircraft Group 49, during the ceremony opening remarks.

The UH-1N holds sentimental value for many who attended the final flight. During the ceremony, many shared their personal accounts about the aircraft.

"The UH-1N is American history; it's a touch tone aircraft of combat for a full generation," said Col. Philip M. Pastino, commanding officer of MAG-49. "I was a lieutenant at the El Toro airshow in 1990 manning my Huey, [during] a static display, when an older gentleman stood back and stared for a good while. After a pause he asked me in a shaky voice if he could touch the Huey. He slowly approached the aircraft and placed his hands on the cargo deck and he started to cry. I didn't know what to do so I put my hand on his shoulder. He told me that his brothers that didn't come home, and were now on the Vietnam Memorial Wall, flew their last flight in a UH-1N. I knew then that it wasn't my Huey at the airshow, it was his and a whole generation's."

The UH-1N platform flown by HMLA-773, has been replaced by the new UH-1Y Venom platform which provides drastically improved capabilities to its predecessor in terms of range, airspeed, payload, survivability and lethality.

In 1996, the Marine Corps launched the H-1 upgrade program, signing a contract with Bell Helicopter for upgrading 100 UH-1Ns into UH-1Ys. The largest improvement was the increase in engine power. Replacing the engines and the two-bladed rotor system with four blades, the Y-model will return the Huey to the utility role for which it was designed. Originally, the UH-1Y was to be remanufactured from UH-1N airframes, but in April 2005, approval was granted to build them as new helicopters.

"A big thing for us is training and the UH-1Y is really going to help us be combat ready and have a more predominant place in Marine Corps aviation," said Lt. Col. Mark Sauer, commanding officer of Det. C, MAG-49.

Though the UH-1N has retired, the Marine Corps and HMLA-773 have great expectations for their new platform, the UH-1Y Venom.

11 SM-6 SCORES AGAIN

The USN executed a successful flight test of the surface-to-air Standard Missile-6 (SM-6) at White Sands Missile Range, Aug. 14. During flight test "Juliet," the USN examined the missile's ability to intercept a subsonic, low altitude target over land. Juliet is one of 10 follow on operational test and evaluation (FOT&E) events planned for SM-6's missile performance and demonstration.

"This event demonstrated SM-6's ability to detect and engage a slow moving target in the presence of complex land clutter," said Jim Schuh, anti-air warfare missiles technical director at the Johns Hopkins University applied physics lab, which is among the Navy's SM-6 partners.

The SM-6 provides an over-the-horizon engagement capability when launched from an Aegis equipped warship linked to a secondary targeting/cueing platform.

"This is an important achievement for Naval warfare," said Capt. Michael Ladner, programme executive office, integrated warfare systems 3.0 programme manager. "SM-6 is undoubtedly the most

10 (From Left to Right) A USMC UH-1Y Venom with an older UN-1N Huey. (USMC)

11 The Arleigh-Burke class guided-missile destroyer USS JOHN PAUL JONES (DDG-53) launches a Standard Missile (SM) 6 during a live-fire test of the ship's aegis weapons system. (USN)

advanced anti-air missile the USN has ever produced and delivered to our Sailors." The SM-6 is the sixth variant of the Standard Missile family developed for the Navy with Raytheon Missiles Systems. Last June, Raytheon was awarded a $275 million contract modification covering SM-6's all-up round production and its spares. The SM-6 programme has been in development for seven years and achieved initial operational capability in November 2013. It is now undergoing follow on T&E, which is projected to be completed during the second quarter of Fiscal Year 16.

Details of the range of the engagement have not been released but officials confirmed it was near the missile's maximum range, thought to be approx 300-400kms.

12 RUSSIAN MISTRALS ON HOLD

In a surprise move the French Government is temporarily halting the delivery of the first of two Mistral-class amphibious assault ships (LHDs) being built in France for the Russian Navy.

The first ship, VLADIVOSTOK, was launched in October 2013, with delivery to the Russian Navy originally scheduled for October 2014.

Given the ongoing Ukraine crisis, the French government said on 3 September - only a day before the start of the NATO Summit in Wales, UK - that "the conditions under which France would authorise the delivery of the first BPC [Batiment de Projection et Commandement] have not yet been met". No mention was made in the statement of second-in-class SEVASTOPOL, scheduled to be delivered in 2015.

France had been under international pressure to halt the deal with one suggestion being made to refund the Russians their money and use the two LHDs as NATO assets. Even Japan has expressed concern at the two ships as both were earmarked for home basing in the Pacific region.

In any respect work on the two ships is continuing until a decision on their fate is made.

HMS ILLUSTRIOUS BOWS OUT

Having sailed over 900,000 miles on operations across the globe, including helping with the aftermath of the first Gulf War, HMS ILLUSTRIOUS has been decommissioned at a ceremony at Portsmouth Naval Base on 28 August, 2014.

The ship's white ensign was lowered for the final time in front of hundreds of guests, ending an era which began with the launch of her sister ship HMS INVINCIBLE in 1977.

Lady Sarah Chatto, whose mother Princess Margaret launched HMS ILLUSTRIOUS in 1978, was joined by 15 of the ship's 17 former commanding officers at the decommissioning ceremony.

Captain Mike Utley, the ship's current commanding officer, said: "It has been a great honour to be the final commanding officer of HMS ILLUSTRIOUS. This is a symbolic day in the history of the Royal Navy as we lower the ensign for the final time on the Invincible Class. We say goodbye to ILLUSTRIOUS with sadness and pride as we remember her outstanding history, but also excitement as the Royal Navy looks to the future and HMS QUEEN ELIZABETH.

ILLUSTRIOUS is being replaced as the nation's helicopter carrier by HMS OCEAN which has just undergone a £65 million refit.

OCEAN will eventually be replaced by two new 65,000-tonne aircraft carriers being built for the navy; HMS QUEEN ELIZABETH and HMS PRINCE OF WALES.

The UK Ministry of Defence is looking to preserve HMS ILLUSTRIOUS as a lasting tribute

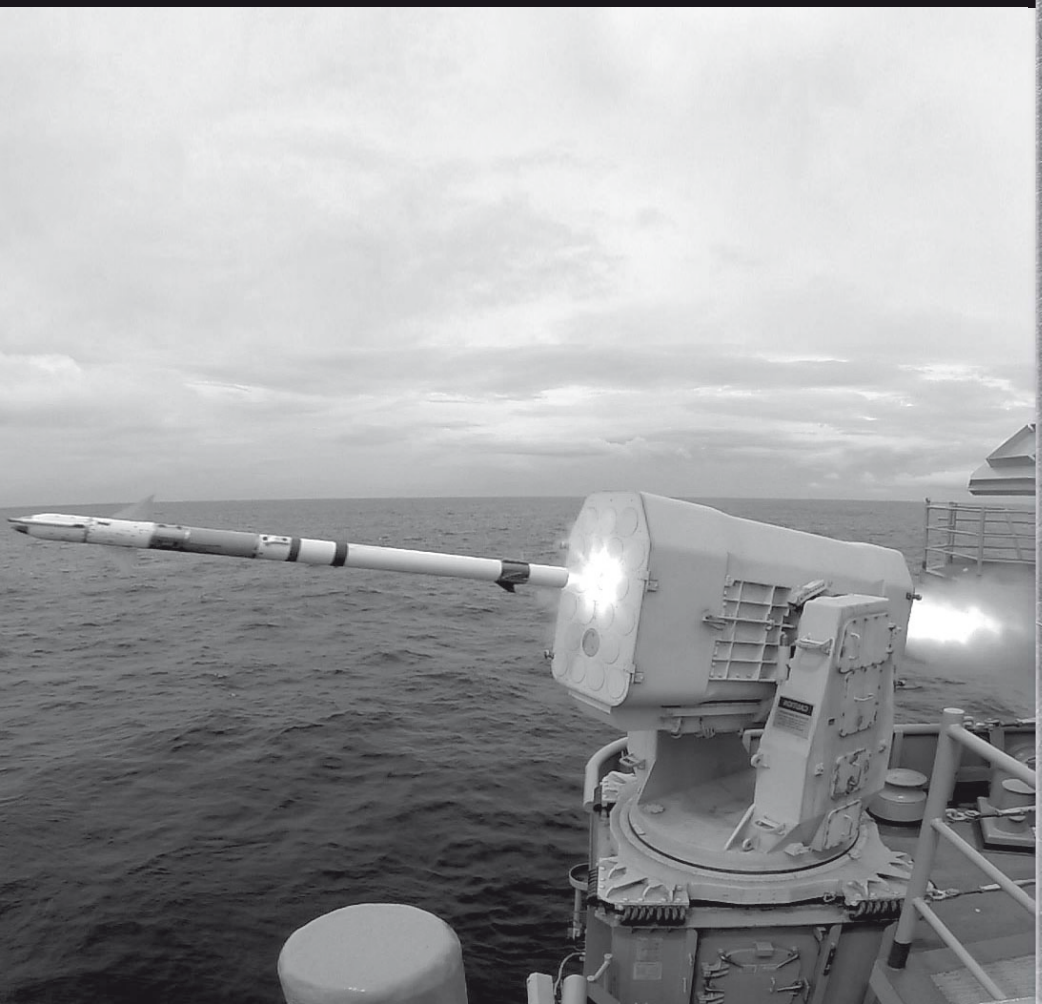
12 The partially complete VLADIVOSTOK being moved for fitting out. The fate of Russia's two Mistral LHDs is currently under a cloud.

to the personnel who served on all three of the Invincible class aircraft carriers.
Bids from private companies, charities and trusts to secure her future are currently being considered, and a condition of sale is that HMS ILLUSTRIOUS must remain in the UK.

13 RAM ON WAY

US Company Raytheon has delivered the first Block 2 variant of its Rolling Airframe Missile system to the USN as part of the company's 2012 Low Rate Initial Production contract. RAM Block 2 is a significant performance upgrade featuring enhanced kinematics, an evolved radio frequency receiver, and an improved control system.
"As today's threats continue to evolve, RAM Block 2's enhanced features give an unfair advantage to naval warfighters across the globe," said Rick Nelson, vice president of Raytheon Missile System's Naval and Area Mission Defence product line. "Along with demonstrating a long-standing international partnership, the RAM programme has a record of 91 consecutive months of contractual on-time deliveries, and continues its remarkable success rate of over 90 percent during flight tests."
RAM is a cooperative program between the U.S. and German governments with industry support from Raytheon and RAMSYS of Germany. The RAM Cooperative program has been in place for over 30 years and has enjoyed excellent integration and technology sharing between both countries.
The initial Block 2 delivery milestone was marked by a ceremony at Raytheon Missile Systems that was attended by U.S. and German naval dignitaries, and Raytheon leaders and RAM programme and team members.
"It is a significant accomplishment for the RAM Programme and the USN to accept our first Block 2 Missiles on time and within budget," said USN CAPT John Keegan, RAM Major Programme Manager. "It is extremely challenging to successfully transition from a development program to a production program. Our success with Block 2 is testament to the outstanding cooperative effort across the entire international team and is indicative of the technical competence and rigor evident throughout the Program." ■

13 A Block 1 RAM leaves its 21-cell launcher from a USN aircraft carrier. The RAM is a most effective anti-missile missile with the block 2 variant adding small boats and helicopters to its target set. (USN)



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
FRIDAY 24 OCTOBER 2014
AT 8.00 pm

BUSINESS

1 To confirm the Minutes of the Annual General Meeting held in Sydney on Friday 4 October 2013

2 To receive the report of the Federal Council, and to consider matters arising

3 To receive the financial statements of the year ended 30 June 2014

4 To elect Office Bearers for the 2014-2015 years 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 10 October 2014

ALL MEMBERS ARE WELCOME TO ATTEND

By order of the Federal Council

Philip Corboy
Honorary Federal Secretary

PO Box 128
Clayfield QLD 4011

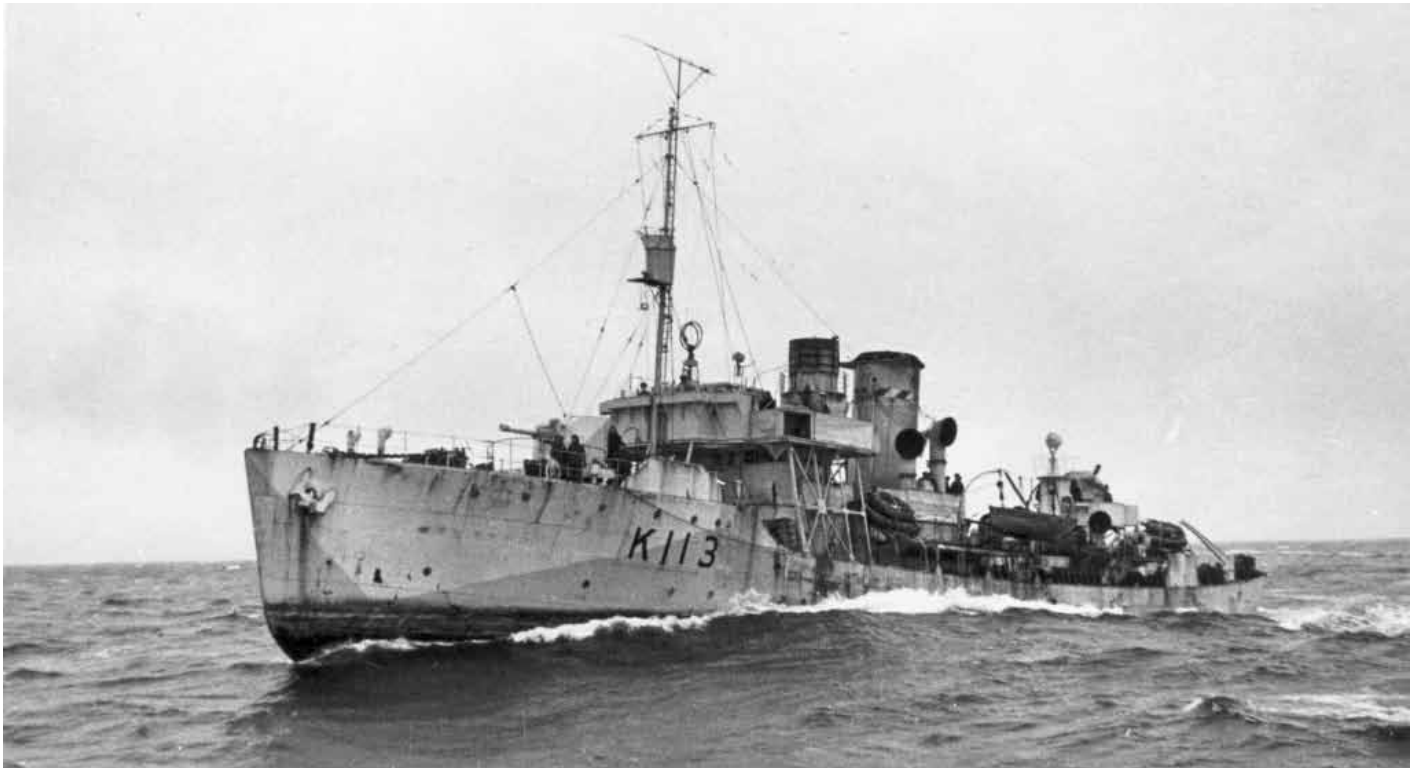
Tel 0421 280 481
Email prc@prcorboy.com

FLOWER CLASS CORVETTES

"THE LITTLE SHIPS THAT COULD"

CPOCSM Jamie McIntyre

The Flower-class corvette was a British class of 267 corvettes used during World War II as anti-submarine convoy escorts during the Battle of the Atlantic. The generic term "Flower" was derived from the Royal Navy's use of flower names for ships of this class. The ships were instrumental in the Battle for the Atlantic which, when won, was the beginning of the end for the Axis powers in Europe.



The RCN Flower class corvette HMCS AVARDIA at sea during the battle for the Atlantic. The Type 271 radar housing can be seen just forward of the funnel amidships.

Military history is filled with forgotten examples of the best way to do things successfully, a prime example being the effectiveness of the convoy system in protecting maritime trade. Believed to have originated in ancient times, the convoy system helped protect British trade from French and American commerce raiders during the Age of Sail, but by the outbreak of World War I was considered to have been rendered obsolete by the advent of steam propulsion.

Once again the crucible of war proved the fallacy of this belief, culminating in the second round of unrestricted submarine warfare which resulted in 25% of all British-bound shipping being sunk in March 1917. Clearly something had to be done, and the answer began with a convoy from Gibraltar on 10 May 1917. From that time on, losses to U-Boats remained unsustainable amongst independently-routed vessels, but dropped to 1.1% of previous monthly figures for vessels in escorted convoys. The advantages of convoys had once again proven how significantly they outweighed the disadvantages that had delayed their implementation for almost too long.

The British Admiralty was still cognisant of these lessons on the eve of World War II, and on 26 August 1939 had assumed control of all British-registered shipping in preparation, but for the first few months of war lacked the resources to implement more than lightly escorted convoys along the Eastern Coast of the British Isles. In the open Atlantic independent shipping was ravaged by not only the resurgence of the U-Boat but also surface raiders, which unlike WW I included capital ships in addition to converted auxiliary cruisers. Although the Royal Navy had 176 Destroyers on strength on 3 September 1939, 60 of these dated from WW1. With numerous requirements across a broad Empire for a force that, as in WW1, was primarily focused on supporting capital ships, the "dirty" work of convoys was all too often left to older vessels that lacked the range, sensors and armament required. This included the 50 Destroyers of the Clemson, Caldwell and Wickes Class transferred from the United States Navy to the RN in September 1940, which were well past their prime by this time.

Fortunately this had been recognised as a potential issue soon after war clouds started looming, and in 1938 the search had begun for something larger and faster than trawlers to provide escort to coastal convoys in and around the British Isles, but still inexpensive and simple enough to be built in large numbers by smaller construction yards. Britain's ship building

The RCN Flower class corvette HMCS WETASKIWIN taken in 1943 in a rough sea. Despite their size the ships handled the North Atlantic sea states well.

industry, still laboriously trying to translate its significant pre-eminence in the Age of Sail to the Industrial Age, was already running at close to capacity for both warship and merchant construction in the larger yards. In January 1939 the Smiths Dock Company of Middlesbrough offered up a development of its 700-ton whale catcher *Southern Pride*, a 15 knot vessel that later became an Anti-Submarine Warfare Whaler herself prior to being wrecked near Freetown on 16 June 1944. The company had previous experience in this, having designed and built the Z-whaler to perform similar work for the RN from 1915 to 1918. The sketch plan was accepted by the Admiralty on 27 February, indicative of the desperate haste which now affected all such planning.

The resulting Flower Class Corvettes were 940 ton vessels with a length of 205 feet (62.5 metres), beam of 33 feet (10.1 metres) and draught of 11.5 feet (3.51 metres). Their triple-expansion reciprocating steam engines were woefully inefficient compared to steam turbines, but like the vessels themselves were cheap and easy to produce in the numbers required by the labour force available. They were also quite frugal, resulting in a range of 3,500 nautical miles (6,482km) at 12 knots, which led to the Flowers becoming much-needed open ocean escorts rather than just coastal. Combined with their portly whale-catcher origins and a single 3-bladed screw, maximum speed was restricted to 16 knots. This was adequate when escorting convoys making at best 7 knots, but was almost 2 knots slower than their primary opponent, the Type VII U-Boat which could reach just over 17 knots on the surface and was also 15 feet longer. This latter statistic actually worked in the Flowers favour, their shorter length giving them a tighter turning circle than the Type VII. This often proved a crucial advantage in the confused, close-in action that typified WW II convoy battles.

HMS GLADIOLUS (K34), the first of an eventual total of 267 Flowers built in both the UK and Canada, was commissioned on 6 April 1940 under the command of Lieutenant Commander HMC Sanders, DSO, DSC, RD, RNR. Fittingly on 1 July 1940 GLADIOLUS achieved the first of an eventual 51 (47 German, 4 Italian) confirmed submarine kills by the Flower Class when she shared in the destruction of the Type I U-Boat U-26 with a Shorts Sunderland Flying Boat of RAF Coastal Command. Heavily damaged by 8 depth charges from GLADIOLUS and bombs from the aircraft, the U-Boat scuttled herself. GLADIOLUS herself was sunk by the Type VIIIC *U-553* south of Iceland on 17 October 1941 whilst escorting Convoy SC-48.

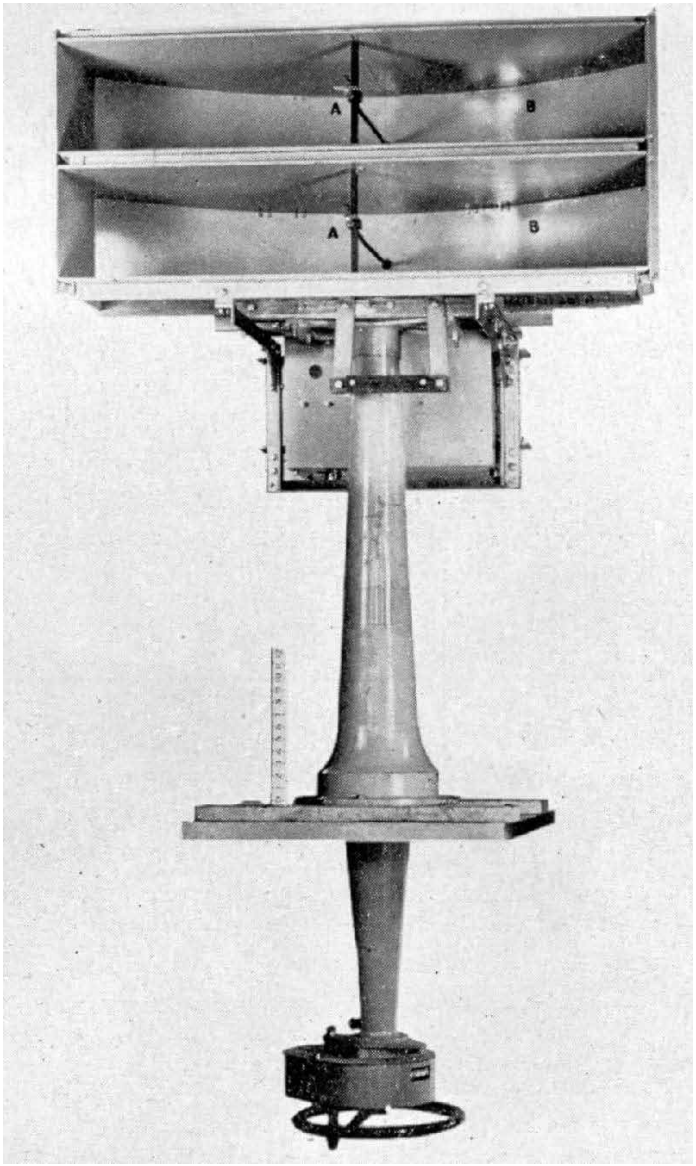
Initial armament was a single BL 4-Inch (102mm) MkIX Naval Gun on the forecastle, 40 depth charges on stern racks and a single QF 2-pounder (40mm) pom-pom on a bandstand over the Engine Room, however due to shortages the latter was often substituted by two .303in (7.7mm) Lewis Machine Guns. Later in the war the number of depth charges carried more than doubled, and additional twin Lewis and Oerlikon 20mm anti-aircraft gun were fitted, up to eight of the latter in areas subject to increased threat of aerial attack such as the Mediterranean.

A dome under the forefoot contained a Type 123 ASDIC set, initially fixed but later made trainable via a hand wheel and eventually by mechanical means. This could detect submerged submarines out to almost 4,000 yards (3,600 metres) in good conditions. This embryonic version of what later became known as sonar peeled back the cloak of invisibility that had theretofore been the U-Boats primary means of defence against attack, and the last thing many U-Boat crews heard was something that sounded remarkably like handfuls of gravel been thrown against their hull.

Initial complement was 47 Officers and Ratings, typically "Hostilities Only" Volunteer Reservists with only a handful of Regulars amongst the Senior Non-Commissioned Officers. Most Commanding Officers were ex-Merchant Marine, which afforded them an empathy and familiarity with the struggles faced by their former compatriots leading slow, vulnerable vessels in convoys. By 1941 the crew had doubled to man all of the new equipment and armament being fitted, leading to men sleeping wherever they could.

Living conditions were adequate for Officers and SNCO's, but for the

The RN Flower class corvette HMS SPIKE HEAD. She was lost to a torpedo from U-136 during 1942. Thirty-six flower class corvettes were lost in the battle for the Atlantic.



A Type 271 radar without the housing showing the antenna front view. There were two cheesecake style parabolic reflectors mounted on top of each other. One was for receive and the other for transmit. The antenna was manually trained by a handwheel in located in the radar office. The radars introduction started to tip the balance in favour of the escorts against the U-Boats.

younger members up forward they ranged from trying to atrocious. Although extremely seaworthy the Flowers had poor sea-handling characteristics, and in the long, low swells typical in the North Atlantic rolls of up to 40 degrees either side were common. There was no air-conditioning or refrigeration, so "respite" after a long watch was spent in a cramped, heaving box with water sloshing about the decks, condensation dripping from the overheads and monotonous, unsatisfying food. In the Winter months there was no escaping the freezing conditions, which could be just as bad or even worse below decks. This would have to be endured for the up to 20 days it took the convoys to cross the Atlantic, with a short burst of shore leave if they were lucky before heading back across again. This would continue unabated until the ship entered refit, underwent a boiler clean or was sunk, but despite this morale generally remained high and crews would fiercely defend their "slow, dirty little boats" in the presence of "puffed-up" Destroyer sailors.

In March 1941 HMS ORCHIS (K76) carried out successful trials with Type 271, a 10cm wavelength radar which could detect a surfaced U-Boat at 5,000 yards (4,500 metres) and a periscope at 1,300 yards (1,180 metres). Now the escorts had the sensors to detect both submerged and surfaced U-Boats in poor visibility and at night, negating the U-Boats preferred tactic of attacking on the surface at night where their low, narrow silhouette and higher surface speed worked in their favour.

Another emergent technology that was fitted to a few of the class was High Frequency Direction Finding equipment, known colloquially as "Huff Duff" after its acronym. This allowed escorts to pinpoint transmitting U-Boats by cross-fixes either in conjunction with each other or with shore sites on both sides of the Atlantic. This exploited the stipulations of U-Boat High Command that U-Boats at sea sent regular, lengthy HF radio messages on weather conditions and convoy sighting reports. With the positions of even quite distant U-Boats now able to be determined, convoys could be routed clear and aircraft dispatched to destroy or drive off the subs.

The exigencies of war lead to many modifications, additions and adaptations to the class, so that by mid-war few Flowers looked or were similar to each other. The biggest structural change was an extended forecastle, usually accompanied by the main mast being moved aft of the bridge superstructure. This along with increased bow flare improved sea keeping, reduced the instances of water entering the now-enlarged ratings mess and gave the 4" gun crew more working room, as well as improving visibility forward. Vessels so modified were known as Improved Flowers, and all new-build vessels from 1943 onwards were to this design.

A significant weapon introduced in 1942 was the Anti-Submarine Projector, also known as Hedgehog. This was a fixed spigot mortar that fired 24 contact-fused 65lb (29kg) bombs fired to land in a 100 feet (30m) diameter circle or ellipse 250 yards (230 metres) ahead of the firing ship. This was introduced as depth charge attacks required the attacking ship to drive directly over the top of the submarine. ASDIC had a null spot where it would lose contact at close range, and wily U-Boat commanders became adept at using the short period between the ASDIC pulses ceasing and the ship arriving overhead to vary course, speed and depth to "side step" attacks. After the depth charges detonated the surrounding water would be too disturbed for ASDIC detections for up to 15 minutes, ample time for the U-Boat to creep beyond detection range. Hedgehog allowed the escorts to attack whilst charging in still and contact, and being contact fused would only detonate if they actually struck the target, allowing contact to be maintained. The intently-watching crews would get immediate notification if their attack had been successful or not, and the 30-35lb (13-15kg) explosive charges in the bombs were more than adequate to breach a U-Boat pressure hull. Kill rates using Hedgehog jumped to 25%, compared to 7% for depth charges. In 1943 it was supplemented (but not totally replaced) by the 3-barrel trainable Squid mortar, which returned to bombs timed to explode at a set depth.

A Hedgehog Anti-Submarine Projector. This was a fixed spigot mortar that fired 24 contact-fused 65lb (29kg) bombs designed to land in a 100 feet (30m) diameter circle or ellipse 250 yards (230 metres) ahead of the firing ship.

The Squid anti-submarine mortar.

Thirty-six Flowers paid the ultimate price in the battle against the U-Boats, 22 being torpedoed, five mined and four sunk by aircraft. The remaining five were lost due to collisions with vessels they were escorting or fellow warships, ample demonstration of the dangers these little ships and their brave crews faced day in, day out.

Flowers also served with Canada (who built 111 of the class themselves), France, Free France (based in the UK), South Africa, the Netherlands, Norway, Greece, India, New Zealand and the United States in addition to the RN during WW II. In US Navy & Coast Guard service they were known as Action Class Patrol Gunboats, and often had an American 3 inch/50 cal (76mm) gun fitted as the main armament. Six of the class building in France were seized by the victorious Germans in June 1940, with the first six entering service as *PA-1* to -3 in 1943-44. They performed coastal escort and patrol work until sunk by the RAF shortly after the Normandy landings in June 1944. The 4th vessel was launched incomplete by the returned French in September 1944 and sunk as a block ship at Nantes, and the remaining two were broken up on the stocks by the Germans.

Like the many Liberty Ships they escorted during the war, their birth as cheap, rapidly built exigency vessels did not stop many Flowers having a busy and productive post-War period. Argentina, Chile, the Dominican Republic, the Republic of Ireland and Venezuela all received ex-RN, RCN and USN vessels, some of which provided continued service as coastal patrol vessels until the 1970's.

Many also saw post-War service in civilian garb, as freighters, tugs, smugglers, weather ships and, in a return to their roots, whalers. In November 1955 ex-HMCS SUDBURY towed the disabled freighter *Makedonia* for over one month in atrocious North Pacific weather conditions. Another two ex-RCN vessels smuggled Jewish immigrants from Europe to Palestine commencing in 1946, and after the creation of the State of Israel reverted back to being warships with the new Israeli Navy.

In 1951 Nicholas Monsarrat, who joined the RNVR at the start of WW2 and rose to the rank of Lieutenant Commander, released the best-selling novel "The Cruel Sea" about his experiences in convoy escorts during the war. This was made into a movie of the same name by Ealing Studios the following year, using the ex-Greek RHN KREIZIS (formerly HMS COREOPIS, K32) to play the fictitious Flower Class Corvette HMS COMPASS ROSE. This was due to the fact that no RN Flowers remained and KREIZIS had been returned to the UK for scrapping, which occurred prior to the movie's release in 1953. During filming KREIZIS wore the pennant K49, leading many to erroneously believe that ex-HMS CROCUS had been used. Jack Hawkins played Lieutenant Commander Ericson, commanding officer of Compass Rose, in an exceptional movie that captures the true essence of what it was like to prepare for and perform a task that moved rapidly from weary drudgery to life-threatening action and back again. Sub Lieutenant Lockhart, played by Donald Sinden in a role that launched his career, was based on Monsarrat himself.

It would be hyperbole beyond compare to call the Flowers "excellent warships", but they were available when needed, in the numbers needed, and did the job demanded of them for six long years during WW II, and someup to 30 years beyond this. Their tally of 51 confirmed kills does not account for the many U-Boats foiled from conducting successful attacks because of the presence and attentions of these little ocean-going terriers.

Today the only survivor is the museum ship ex-HMCS SACKVILLE on display in Halifax, Nova Scotia. Restored to her wartime appearance, she proudly represents the many brave sailors who gave their all, and sometimes everything, to keep Britain's vital lifelines open in her darkest hour. ■

The RCN Flower class corvette HMCS WEYBURN which was lost to a mine in February 1943 off Gibraltar.

ARMY'S VIEW OF MARITIME SECURITY STRATEGY

CHIEF OF ARMY SPEECH TO THE 2013 SEAPOWERCONFERENCE

LTGEN David Morrison AO, Chief of Army

Despite some good natured rivalry, the bonds between our Navy and Army are deep and enduring, forged in the crucible of war with its shared perils and losses. The following is a speech made by Lieutenant General David Morrison AO, Chief of Army, to the recent Pacific 2013 conference. It was a remarkable speech that could have been given by the Chief of Navy. However, as then Chief of Navy remarked, if he gave this then no one would take note. From the Chief of Army it means more.

Sydney's Bondi Beach. The vast majority of Australians believe that we are a national girt by beach, rather than sea. Meaning that our reliance on maritime security isn't well understood and drives a "continental mindset" at odds with out history.

For reasons, which I intend to address, I believe that we as a nation sometimes fall prey to a collective amnesia about the extraordinary service of the Royal Australian Navy.

Over a century ago, the great sea power theorist Alfred Thayer Mahan wrote eloquently of the silent, inexorable and invisible operation of the blockade which crushed the innards of Napoleon's Empire. The achievements of our soldiers, enhanced, indeed perhaps even distorted by the Anzac mythology, has, in my view, created a foundation narrative that has led to our Nation accepting the fruits of our maritime security as a free public good. It is as invisible as Mahan's blockade.

Our trade flows freely, our petrol stations are replenished, our supermarket shelves are full to meet our whims and our commerce flourishes. Yet, Australians collectively do not reflect on the enormous national investment involved in sustaining the maritime conditions for that happy state of affairs, nor do they consider overly that much of it is also underwritten by the United States as the leading global power of our era.

While many of Mahan's insights are today of primarily historical value, his assertion that the oceans of the world constitute ubiquitous highways is so profoundly obvious as to conceal its genius, in much the same way that Clausewitz's observation that war is the violent prosecution of policy now sounds self-evidently banal, having become conventional wisdom. That Australia is an island, albeit one of immense mass, is equally as obvious. So our survival, even in peace time, depends on the sea.

Yet, despite universal lip service to the innately maritime character of our geography, the western civilization that has grown here since European settlement has not, in my view, developed a deep, intrinsic link to that character. As another Maritime theorist, my friend VADM Ray Griggs told the Australian Strategic Policy Institute in 2011, that a more

Australian Army soldiers at the recent RIMPAC 2014 exercise in Hawaii disembarking from a USMC AAV-P7/A1 amphibious tracked vehicle to assault a beach. Exercises like these and links with organisations like the USMC provide our army with the 'wet soldering' training they need for Australia's future security. (Army)

appropriate wording in the first stanza of our national anthem may have been 'girt by beach' rather than 'girt by sea.' He was pointing to the underdeveloped consciousness which should properly underscore mature, true sea mindedness in Australia. His point was well made and it concerns me every bit as much as it bothers him. Our strategic culture, and the strategic policy which incubates in it, are the poorer for that cognitive failure, which is derived from a deeply entrenched continental mindset.

In 2013 I conducted my military history conference, the theme of which was Armies and maritime strategy. There I heard an insightful presentation from Professor Michael Evans, who I believe to be the most innovative and influential strategic thinkers currently working in Australia. He expounded on the lack of sea mindedness to which VADM Ray Griggs had alluded in that eloquent quip in 2011.

He described Australia as a maritime nation with a continental culture. His hypothesis was carefully arrived at through delving into the national psyche and soul. He analysed the narrative of the Australian settlement, and the degree to which we define ourselves as a sunburnt country. Scrutiny of the stories we tell ourselves about who we are, show a people pitted against a harsh, implacable and ultimately forbidding continental environment. And so, while we revere the sacrifice of our diggers at Gallipoli, how many people really understand the naval and amphibious campaign which lodged us on what Chris Masters has termed The Fatal Shore? The digger legend is powerful, but it skews the way Australians view security, especially the wider contribution of this nation to the global order of the last Century and our obligations to maintaining that benign order in this one.

Yet, this absence of pervasive oceanic consciousness, disguises the fact that European settlement of this Great Southern land was achieved by the leading maritime power of that era. Likewise, it ignores the reality that our security was initially foundered in no small part on Great Britain and, later, on its liberal democratic successor the United States. In plain language, our prosperity and role in the world is reliant on freedom of navigation and the unimpeded use of Mahan's great highways which is guaranteed by the dominant maritime power of the day, at a most significant discount to the expenditure of our own national treasure.

The naval and military professionals in this room grasp this reality, but too few of our fellow citizens do as well. More worryingly, I fear the same may be true of many of some who seek to advise our policy makers. However, this is not the counsel of despair. Australians are nothing if not pragmatic. Regardless of this myopia, our strategic practice has been intuitively shrewd. We have collaborated with the dominant liberal, democratic maritime power du jour since Federation and have benefitted immensely from that choice.

Again, as I reflected on Mike Evan's call to raise public consciousness about our maritime future in the rapidly growing, dynamically changing, Indo Pacific region, I recalled former Prime Minister John Howard's pithy, yet insightful, warning that Australia need not choose between its history and its geography. Read in conjunction with Paul Keating's similarly profound insight that Australia must seek its security in Asia rather than from Asia we can discern the rapid progress Australia has made from the aberrant years when we sought to secure Australia behind the moat of the so called sea – air gap.

There is a warning in this – that because of our lack of an oceanic mindset, we risk forfeiting all those other natural elements of maritime power with which we are lavishly endowed. However, as soldier and capability manager I am optimistic about our current strategic focus. Here is why.

We have come a very long way since the strategic shock of 1999 in East Timor roused us from the torpor of the mindset of the Defence of Australia, narrowly construed as continental defence. In that regard, I would demur from John Howard in a minor, though not purely semantic, manner. As he sagely argued, we need not make a false, binary choice between our European origins and Asian geography to

Filling the car. How many motorists understand or are aware of the reliance on the sea and its security Australian has?

achieve Paul Keating's vision of security 'in Asia.' But we must choose our TRUE history.

We need to recognise that despite the prodigious feats of arms of our soldiers, and the romance of the bush, our soldiers have never fought a battle on our continent. May that remain so. But as long as the gap between myth and reality in our national identity and ancillary strategic culture remains so great, we will struggle to achieve our potential as a second tier maritime power.

For that classification I am indebted to that fine strategic scholar Beatrice Heuser who would situate Australia among relatively sophisticated medium powers for whom local sea control, albeit for particular periods of time, is both possible and indeed a strongly desirable capability objective. However, area sea control is unachievable for us and it remains the monopoly of great naval powers.

Of necessity we can only collaborate with compatible major powers and contribute to good order at sea and achieve limited force projection in coalition with our allies.

We are well on the way to achieving that level of maritime capability in Australia with political support across the spectrum. That vision, of a seamlessly joint ADF, structured to implement a maritime strategy in the defence of Australia, through denial of the use of our land, sea and air approaches to our nation is correct. It is supported by the ADF senior leadership and is underpinned by a Defence Capability Plan which will put flesh on the bones of that vision.

Of course it will require a shift in national resources to fund and sustain it. And in the aftermath of our longest war, fought primarily in a land-locked country, we must take the intellectual lead in explaining this to the Australian public.

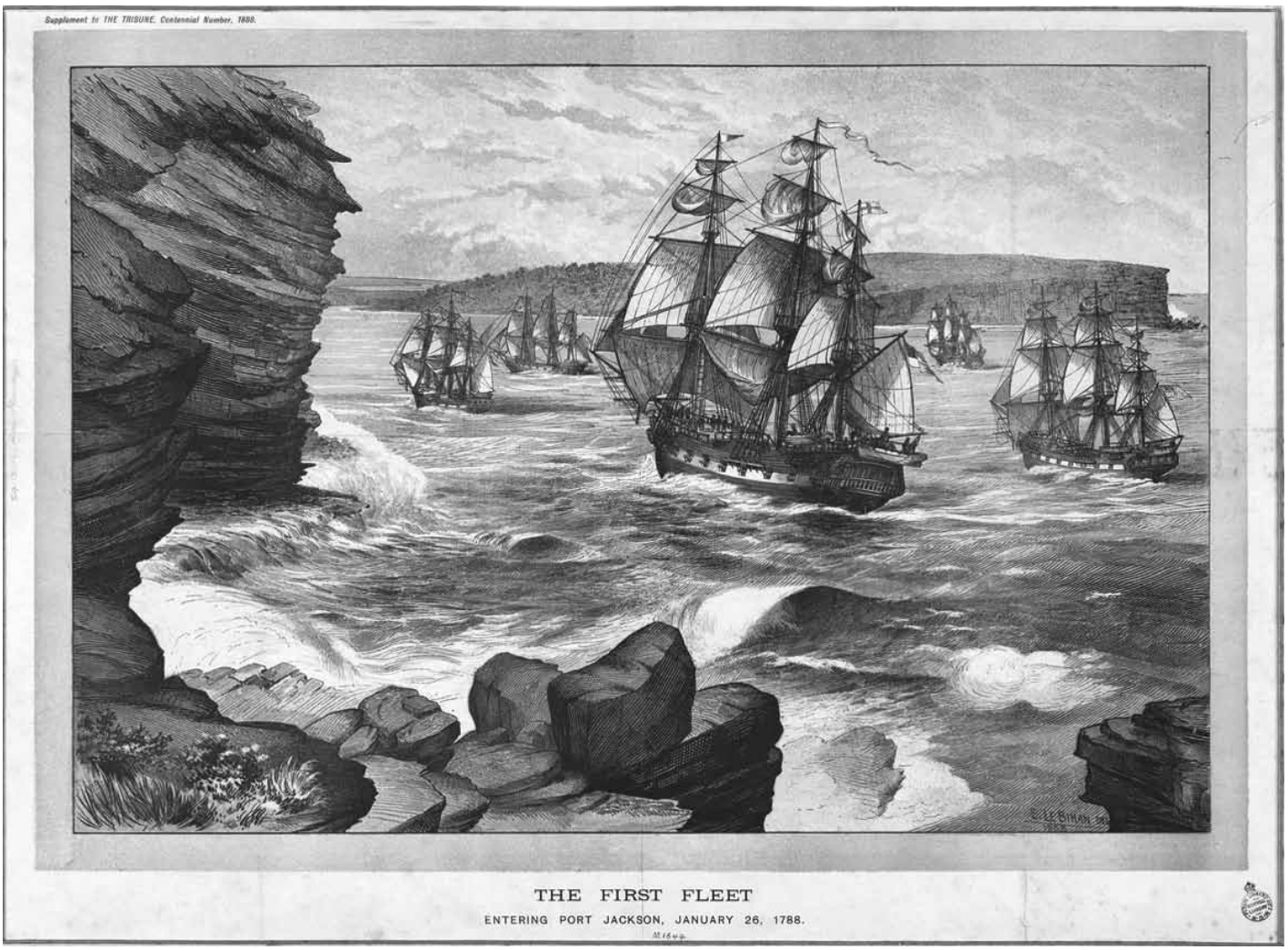
After all they must fund it, and provide their sons and daughters to serve in this joint force in an era when individual opportunity and self actualisation have reduced the appeal of service careers. That is why our deficit in oceanic consciousness has the potential to undermine our centre of gravity in the pursuit of professional mastery of joint maritime warfare.

Perhaps the thousands of proud Australians who cheered the arrival of that first flotilla 100 years ago understood better than we do the nexus between an actively engaged citizenship and maritime power than we do. As senior advisers to the Government, we must take a moral and professional lead in this. Moreover, we must be truly joint in our advocacy. As I have stated somewhat ad nauseam, Australia needs its ADF more than it needs its Army, Navy and Air Force and a joint maritime strategy is only as strong as its weakest service. None of us can afford the dubious luxury of short term single service 'wins' at the expense of the coherence of our maritime capability.

Again, I have never been more optimistic as to our future notwithstanding the climate of austerity which is setting the tenor of our strategic debate. In my remaining time today I shall explain how Army's modernisation axis of advance is inherently joint and postures us to take play our role in our maritime strategy as described under extant strategic guidance.

In general, Armies modernise by drawing lessons from their operations and calibrating their experience against history and the changing character of war as determined by technological change and politico-cultural trends. After a decade at war, and even longer on sustained operations across a diverse range of threat environments, against a range of foes, we have moved quickly to enhance our firepower, to digitise our sensor shooter links and better align our command and control systems to our higher joint-operational headquarters. Internally

A fully loaded container ship. The amount of products and components imported to Australia via the ubiquitous highway that is the sea is massive. Australia's and the world's security rely on unhindered freedom of navigation of the sea.



A painting made in 1888 of the First Fleet arriving in Port Jackson. Australia was settled from the sea by the then preeminent naval power.

we have also better aligned our force generation cycles to strategic guidance.

We are in the midst of the most comprehensive re-equipment and modernisation program since the end of the Second World War. The end state will be an army that can generate combined arms effects in a joint coalition setting while surviving against either a peer competitor or a potent irregular enemy.

We are re-organising to field three standard multi – role medium weight combat brigades. We are shifting from a light infantry army to a light mechanised army deployable by sea rather than just air and capable of implementing the guidance of the government which decrees that we be able to deploy a battalion group for a contingency with our Primary Operating Environment, while simultaneously sustaining a brigade group on operations in the immediate neighbourhood.

Plan Beersheba rounds out the improvements begun in the wake of the 1999 East Timor crisis, which spawned that guidance and the derivative roles and tasks for the Army and ADF. Significantly, the introduction of the Landing Helicopter Docks (LHD) will be a transformative development. Developing an army component capable of 'wet soldiering'.

The devil will be in the detail. The range of specialist skills, trades and employment codes to conduct even permissive entry operations is formidable. Delivering land effects from sea platforms is the most demanding military task that can be asked of a joint force. Few nations on earth can achieve it. We will soon be joining that elite club. But the price of admission is high and we need to bring our society with us if we are to achieve it. It requires a national commitment not an ADF plan.

There is much to be done. But as we reflect on the challenges that our remote nation overcame to fund, design and build that majestic fleet which steamed into this great harbour 100 years ago, we must surely conclude that we are capable of meeting any future challenge if we can muster even a portion of their resolve and patriotism. ■

An Army CH-47D Chinook delivering an underslung M-777 155mm Howitzer. While Army is the master of producing land effects its ability to producing them from the sea with equipment not designed for that role (like the Chinook) will present formidable challenges. (Army)

STATEMENT OF POLICY

For the maintenance of the Maritime wellbeing of the nation.

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

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

The Navy League:

- Believes Australia can be defended against attack by other than a major maritime power and that the prime requirement of our defence is an evident ability to control the sea and air space around us and to contribute to defending essential lines of sea and air communication with our allies.
- Supports a continuing strong alliance with the US.
- Supports close relationships with all nations in our general area and particularly New Zealand, PNG and the island States of the South Pacific.
- Advocates the acquisition of the most capable modern armaments, surveillance systems and sensors to ensure that the ADF maintains technological advantage over forces in our general area.
- Advocates a significant deterrent element in ADF capability enabling powerful retaliation at significant distances from our shores.
- Believes the ADF must be capable of protecting commercial shipping both within Australian waters and beyond, recognising that this means in conjunction with allies and economic partners.
- Endorses the control of coastal surveillance by the ADF, and the development of the capability for the patrol and surveillance of all of Australia's ocean areas, its island territories and the Southern Ocean.
- Welcomes Government initiatives concerning the recovery of an Australian commercial fleet capable of supporting the ADF and the carriage of essential cargoes to and from Australia in times of conflict.

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

- Supports the concept of a Navy capable of effective action in war off both the east and west coasts simultaneously and advocates a gradual build-up of the fleet and its afloat support elements to ensure that, in conjunction with the RAAF, this can be sustained against any force which could be deployed in our general area.
- Welcomes the announced increase in Defence expenditure to 2% of GDP over the next 10 years.
- Believes that the level of both the offensive and defensive capabilities of the RAN should be increased and is concerned to see that the substantial surface and sub-surface capability enhancements contained in the 2009 Defence White Paper should survive the forthcoming 2014 review of Defence capability; in particular a substantially strengthened submarine force, 3 Air Warfare Destroyers (AWDs), 2 landing ships (LHDs), 8 new frigates (Anzac class replacements), 20 offshore combatant ships, 6 heavy landing craft and substantial numbers of naval combatant and ASW helicopters.
- Strongly supports the acquisition of large, long range and endurance, fast submarines and, noting the deterrent value, reliability and huge operational advantages of nuclear powered submarines and their value in training our anti-submarine forces, urges the consideration of nuclear power as an option for those vessels.
- Notes the potential combat effectiveness of the STOVL version of the JSF and supports further examination of its application within the ADF.
- In order to mitigate any industry capability gap following the completion of the AWD program, recommends bringing forward the start date of the planned future frigate (Anzac replacement) program, recognising the much enhanced capability projected for these ships.
- Urges that decisions to enhance the strength and capabilities of the Army and Air Force and to greatly improve the weaponry, and the intelligence, surveillance, reconnaissance, cyberspace and electronic warfare capabilities of the ADF be implemented.
- Supports the development of Australia's defence industry, including strong research and design organisations capable of the construction and maintenance of all warships and support vessels in the Navy's order of battle, and recognises the fundamental importance of a stable and continuous shipbuilding program for the retention of design and building skills and the avoidance of costly start up overheads.
- Supports the efforts by Navy to rebuild the engineering capability to ensure the effective maintenance and sustainability of the fleet.
- Advocates the retention in preservation (maintained reserve) of operationally capable ships that are required to be paid off for resource or other economic reasons.
- Supports a strong Naval Reserve and Australian Navy Cadets organisation.
- Advocates a strong focus on conditions of service as an effective means of combating recruitment and retention difficulties.

The League:

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

The RN Daring class destroyer HMS DIAMOND providing escort duties to the USN aircraft carrier USS Dwight D. Eisenhower. (USN)

The Queen Elizabeth class aircraft carrier QUEEN ELIZABETH being manoeuvred into position for fitting out. (Aircraft Carrier Alliance)

The Japanese Hyuga class anti-submarine warfare destroyer JS ISE during the recent RIMPAC 2014 class photo. (USN)

The South Korean destroyer SEOAE RYU SEONG-RYONG at RIMPAC 2014. This South Korean version of the USN Arleigh Burke Flight IIA is actually more capable in weaponry than the USN class and is probably more aptly described as a light cruiser. (USN)