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Given that funds available for defence are likely to be limited for some years to come (unless of course a presently unforeseen emergency arises) the structure review ordered by the government twelve months ago was necessary and appears to have been carried out with a high degree of co-operation between the Services and between the uniformed and civilian members of the defence hierarchy.

The purpose of the review was to maintain as far as possible the proportion of funds available for capital equipment and works, funds that in percentage terms languished in the 'teens throughout the nineteen-seventies and early 'eighties before rising to the vicinity of 10%. Irrespective of other major capital expenditure categories, notably personnel (uniformed and civilian) and day-to-day running expenses, had to be pruned.

The changes are planned to take place over a period of ten years and will certainly not happen overnight. Indeed, in some respects it seems a rather long period as it will be many years before some urgently needed items, such as airborne early warning and control aircraft and a training/helicopter support ship, can be brought into service.

Changes in the structure of the Army will undoubtedly cause anguish in many quarters, in particular the decision to shed over 5000 regular personnel and introduce a "ready reserve" of 3200. It has been calculated that the cost of ready reservists will be less than half (42%) that of regulars, but this remains to be proved as does the ability of the Army to attract the necessary number of recruits even with generous inducements. The Navy and Air Force are also to each have a "ready reserve" but the numbers are much smaller — 450 in each Service. Whether the "ready reserve" and existing "ordinary" reserve will sit comfortably together, only time will tell.

Regular Air Force personnel will be reduced by over 4,000, proportionately more than either the Navy or Army. The Air Force has been more "self-contained" than the other Services, the Navy in particular always having had a substantial civilian support element in its structure, a feature which will now be more widely applied in the ADF. It was one of the reforms recommended by the Wriglcy Report and generally regarded as acceptable.

The Navy has been extensively reorganised in recent years, a consequence of the government's decision in 1983 to discontinue fixed-wing flying in the Service; in the process its strength has been reduced by some 2000 personnel and could not be reduced much further without seriously impairing readiness to react to government foreign policy requirements. This fact has been recognised and the Navy does not face major manpower cuts. The Service is currently slightly under strength and over several years about 600 regulars will not be replaced.

The Australian Defence Force is not numerically large compared with a great many other defence forces, indeed it is quite small and any diminution is to be greatly regretted. Given the prevailing economic and political climate, which seems unlikely to change in the short or medium term, the responsibility of the Navy League and other like-minded organisations and people to ensure that governments honour their promises to provide the nation with an effective defence force, is considerable. When the next scenario arises and changing social values, the task of promoting national security in peacetime will be even more difficult than it has been in the past.
Dear Sir,

I was in Britain during the build up to the liberation of Kuwait. It is hoped that we will always enhance this vital relationship between the very professional Royal Australian Navy and their real allies, the UK and USA.

Yours faithfully,

G. HALLEY,
Commodore RN (Ret)
Woollahra 2025
Navy strengthened under Force structure review

The auxiliary mine-sweeper (craft of opportunity) programme will be continued to complete the 'proof of concept' as it is clear that the concept can work in practice but the planned acquisition of a core force of auxiliary mine-sweepers will now not take place.

The auxiliary mine-sweeper will be built in Australia.

No further inshore minehunters (the Bay class) will be built. However, a number of proven overseas designs are available to meet the need.

The minewarfac systems centre will be constructed at HMAS WATERHEN in Sydney, where all mine warfare craft will be based. No MCM vessels will be based on the west coast.

Propellers:
- Number: 1
- Number of Blades: 3
- Diameter: 23 ft
- Pitch: 7
- Area: 1,172 square inches

Trials:
- Where Run: Lower Hope, River Thames
- Duration: 3 hours
- Draft Mean: 37 ft
- Forward: 37 ft
- Aft: 37 ft
- Displacement: 81 tons
- Speed: 22 km/h
- L.R.F: 1,190
- Revolutions: 406.3
- Miles: 6

Two Collins class submarines will be based on the west coast. The seventh and eighth units will not be built. There is no intention of resuming construction of the eighth Collins class submarine. The sixth Collins class submarine deployed to the east will probably be accommodated in the fleet base in Sydney.

The Auxiliary Mine Sweeper, Countess of Hopetoun, was the last vessel to be ordered for the Victorian naval force. The 75 ton boat was built by Yarrow & Co, at Poplar in London. She was laid down in 1890 funded and completed in 1891. Countess of Hopetoun was named after the wife of the Governor of Victoria and sailed to Australia via the Cape of Good Hope in 154 days. She was crewed by 19 officers and men, accommodation being provided on board. Her hull was constructed of galvanised mild steel, divided into compartments by nine watertight bulkheads.

Before sailing to Australia the "Countess", then referred to as No. 905 by her builders, undertook trials on 25th August, 1891. On this day her primary particulars were as follows:

Machinery: Engines: Cylinders — 14 in/21 in and 32
Cylinders — 14 in/21 in and 32
Stroke — 16

Boilers: 1 Locomotive

Propellers:
- Number: 1
- Number of Blades: 3
- Diameter: 23 ft
- Pitch: 7
- Area: 1,172 square inches

Trials:
- Where Run: Lower Hope, River Thames
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- Displacement: 81 tons
- Speed: 22 km/h
- L.R.F: 1,190
- Revolutions: 406.3
- Miles: 6

_SPEED OF TORPEDO BOATS_

The torpedo boat left the builder's yard at 1048 on 25 August into very rough conditions and the wind against the tide. Twenty-seven men were embarked to judge No. 905's effectiveness, as well as 160 to 170 lbs psi and 3½ to 5 inches WG.

Trials were also undertaken with turning circles to port and starboard in 70 and 85 seconds respectively, the diameter being about twice the length of No. 905. Steering was then tested by hand and from both wheels followed by stopping, starting and reversing of the engine. All tests were satisfactory.

Water was also run into the holds to test the watertight arrangements. Indication diagrams were finally taken by two officials from Chatham. The highest speed attained during the trial occurred at 1349 when 2448 knots was achieved.

From Engineering 20 January 1893

THE STRENGTH OF TORPEDO BOATS

On the present page we give an illustration, prepared from a photograph, of the bow of a first-class torpedo boat which had been in collision with a sailing barge. The matter is interesting as affording a record of the amount of rough usage these lightly-built craft will stand without absolute destruction. The vessel in the illustration was built by Messrs. Yarrow & Co. and for the Government of Victoria, and at the time of the accident was 240cwt of water, two air compressors, a galley, dynamometer, etc.

The vessel was made at 1233 for the three hour trial. During this period No. 905 made 72,855 revolutions with a better pressure of 250 to 275 lbs psi and 4½ to 5 inches WG.
The vibration, cv^n right aft. was nothing great that the high-speed trials arc not for a torpedo boat, viz. about 17 knots. At full speed the swell made by torpedo boats is so

We left the builders' yard at 1 lam. and arrived late, but all safe, at the works at the Mucking Lighthouse, when turning round to go down South Sea Reach something went wrong with the steering gear. A clutch had worked back without its being noticed, and the consequence was the steersman lost all control, and, before the engines could be got back without its being noticed, we ran stem on, at about 18 knots speed, into a large wooden sailing barge, loaded with over 100 tons of wheat, in 18-knot speed, into a large wooden sailing barge, loaded with over 100 tons of wheat, and had been to the Norse and back again to the Mucking Lighthouse. We had been furnished with a description of the accident by one who was on board at the time of the accident by one who was on board at the time or

We have been furnished with a description of the accident by one who was on board at the time, and we cannot do better than give the facts in the writer's own words.

"We left the builders' yard at 1 lam. and ran down to Gravesend at quite an easy speed for a torpedo boat, viz. about 17 knots. At full speed the swell made by torpedo boats is so

Araming the torpedoes. 1906

Damage to the bow after colliding with a sailing barge during trials.

8 The Navy, July-September, 1991

The Navy, July-September, 1991 9
which prevents the fire being extinguished by a sudden influx of water, owing to the skin til slippd. The next year she was overhauled and new slabs fitted where it remains mostly covered by sand and

The years 1916 and 1917 were spent in Western Port on 11th February, 1913. Two
day later Childers grounded on a bank, Countess of Hopetoun attempting to pull her out Minesweeping duties in August and

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which is the protection of the man operating the gun. Further aft is the entrance to the officers' cabin, and nearer the stern is a screen behind which is the after, or deck steering wheel. This screen is made of brass in order to avoid the danger that might arise through it affecting the compass. On the stand just forward of the signal mast the searchlight is placed. It is, however, capable of being moved, and arrangements are made for firing it on either of the gun stands, or on the top of the conning tower; leads being provided to conduct the current to whichever position may be considered desirable at the time. The light is of 6000 candle-power. The position may be considered desirable at the time. The light is of 6000 candle-power. The

pirate in exercises at Swan Island for a period of three weeks. The annual Easter
cruise was held from 3rd to 6th April, 1896. During 1897 she exercised with the monitor

The CAREER OF COUNTESS OF HOPE TOUN

In August, 1902, Countess of Hopetoun was damaged while in the process of being slipped. The next year she was overheated completely and from 15th January, 1895,

CHILDERS, together with the target practice boats Paluma and Childers, operated with Countess of Hopetoun and Protector in the area in the late 1890s.

2. On 7th January, 1914, her 3 pounder gun

on target practice duties and subsequently paid off to reserve.

3. On 14th April she left for Melbourne having

once a month, to investigate an unnamed wreck along the southern Victorian coast.

The齊 C HILDERS meeting with the submarine during the September of 1918.

On 1st May she was moored alongside at the dock and took the crippled torpedo boat in tow. By 0555 she was moored alongside at the dock. A court of enquiry was convened to investigate the matter.

The Navy, July-September, 1991

which is the protection of the man operating the gun. Further aft is the entrance to the officers' cabin, and nearer the stern is a screen behind which is the after, or deck steering wheel. This screen is made of brass in order to avoid the danger that might arise through it affecting the compass. On the stand just forward of the signal mast the searchlight is placed. It is, however, capable of being moved, and arrangements are made for firing it on either of the gun stands, or on the top of the conning tower; leads being provided to conduct the current to whichever position may be considered desirable at the time. The light is of 6000 candle-power. The position may be considered desirable at the time. The light is of 6000 candle-power. The
Exercise 'Squadex' - LCHs Get Together

by SBLT SALLY BICK, Brisbane Port Division

Five amphibious ships came to Brisbane to undertake a major exercise in Moreton Bay during February, 1991.

HMAM BALIKPAPAN (LCDR R. Morrison), HMAS BETANO (LEUT S. McCormick), and HMAS TARAKAN (LEUT C. McMASTERS), all heavy landing craft, had been based at HMAS MORETON from 1973 to 1985 as part of the former Amphibious Squadron.

The vessels reunited in early 1991 to exercise in the Moreton Bay area as part of Exercise Squadex, the first major amphibious exercise for six years. PNRF and Reserve personnel practised amphibious warfare techniques and procedures in a multi-ship situation, according to the Commander of the Task Group, Commander Alan Regan.

The exercise was held in two phases, the first involving lectures, NBCD exercises, VERCQREP, gunnery practice, a shakedown exercise involving beach landings, and amphibious manoeuvring procedures in company. "During the second phase, the ships were involved in landing equipment armoured personnel carriers and heavy trucks from the Army 6th Brigade in conjunction with two medium-sized landing craft from the Army's 34th Water Transport Squadron at a number of locations on Moreton Island and Bribie Island," he said.

During the exercise, the ships participated in an impressive Amphibious Review on the Brisbane River as part of RAN Veterans Corvettes Association memorial service at the Dockside Centre. Brisbane Port Division's band provided entertainment to a large crowd during proceedings.

Despite the fact that four of the ships are no longer based in Brisbane, BALIKPAPAN is based at Darwin and is operated by the local Port Division, while TARAKAN is based at HMAS CAIRNS and operated by permanent naval staff from HMAS CAIRNS.

HMAS BRUNEI won the proficiency shield for Squadex adding to her reputation gained during the time of the Amphibious Squadron when she was awarded the LCH proficiency award the most times.

The landing craft on Bribie Island

Division of the Royal Australian Naval Reserve while TARAKAN is based at HMAS MORETON operated by permanent naval staff from HMAS CAIRNS and Reserve personnel from Cairns Port Division.

Five RAWN RAN RAN LCHs in a line abreast formation

Landing equipment on Bribie Island

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The Navy, July-September, 1991 13
The Capture of MV KRAIT
A POSTSCRIPT

by LYNETTE RAMSAY SILVER

MV Krait is a fascinating little ship. Considering her size and her rather unremarkable appearance, this WWII vessel evokes more than her fair share of interest and good reason.

Well known to most Australians because of the part she played in Operation Jaywick, the finding of her during 1943 by a Royal Australian Navy minesweeper has formed an important part of the Australian National Maritime Museum's collection.

For decades it was claimed that the minesweeper HMAS Goulburn had captured MV Krait, formerly the Japanese fishing vessel Kofuku Maru, shortly after the outbreak of war with Japan, thereby making her the first Japanese vessel captured by the Royal Australian Navy in the Pacific Zone.

These claims were accepted without question. Indeed, it was not until mid-1990 that intensive research by myself and Major Tim Hall, on the origins of this famous little ship, revealed that the first claim was not true. On December 11, 1941, Goulburn had been taken into custody not Kofuku Maru, but another ship of very similar appearance and with a very similar name, Shofuku Maru (see The Navy, Jan-March 1990, pp. 23-25).

With Goulburn out of the running, this had the tantalising question of who or what had captured Krait. Although our research had proved that most of the accepted history of the ship was erroneous, there was the remaining deep-seated claim which, despite concentrated effort, could not be confirmed by documented evidence, not could it be discounted. In publications far and wide, ranging from British Naval histories to local museum newsletters, the claim that the Kofuku Maru was the first Japanese ship captured by the RAN in the Pacific Zone after the outbreak of war with Japan.

When research showed that at noon on December 8, 1941, a scant seven hours after hostilities commenced with Japan, it appeared that the riddle about the origins of MV Krait was all but solved. However, it was not quite that simple. Although the capture of Goulburn's sister ship, HMAS Maryborough, which had captured Krait, was established, it appeared that the identity of the ship was not quite that simple. Although the capture of Maryborough's ship, a Japanese fishing vessel, was recorded rather sketchily in Goulburn's log, the log of HMAS Maryborough, which would have given all the relevant details, including the name and number of the Japanese ship, had disappeared. The only mention of the capture was in a summarised form — a typed copy of Maryborough's Letter of Proceedings (written after the event, naming the vessel as Kofuku Maru).

The writer was now faced with conflicting information. Kofuku Maru was claimed to be the first ship captured by the RAN in the Pacific Zone. The only bit that was beyond doubt, from the time she left Singapore — is born out by photographs taken of Kofuku Maru shortly after her arrival in Australia in December 1942, and HMAS Maryborough, the ship apprehended by HMAS Maryborough at noon on December 8, 1941 — the long standing and widespread claim that it was Kofuku Maru that was captured by Maryborough is clearly not true. It appears that this forlorn, which has elucidated all others, surfaced in the sixties, along with a number of other "facts" about Krait, all of which have now been disproved. Which leaves the question — if the RAN did not capture Kofuku Maru on December 8, 1941, who did?

Now THAT IS quite another story.

Lynette Ramsay Silver
May 1987

The author acknowledges the immense assistance given to her by Mr Barney Ogle, whose generosity in allowing access to his photographs solved the riddle. Mr Ogle has also kindly provided additional photographs which illustrate this article.

NOTE: A book on MV Krait, written by Lynette Silver in conjunction with the research of Major Tim Hall, will be released shortly.

The similarity between KOFUKU MARU and FUKUYU MARU is clearly evident in this photograph, taken as FUKUJU MARU was showing the order to come alongside HMCS MARYBOROUGH.

Watched by a fellow crewmember. five of MARYBOROUGH'S personnel prepare to board FUKUYU MARU.

Captured by Lynette Ramsay Silver
May 1987

The Navy, July-September, 1991
Victoria Welcomes Home Gulf Contingent

Victoria has had the opportunity to welcome home, and pay tribute to its Gulf Contingent over three days in July, 1991.

The Premier, Mr Kennett said the public would be invited to a thanksgiving service at St Paul's Cathedral on Sunday July 7.

Mr Kennett and the thanksgiving service would be followed by a luncheon reception for the 187 families who had relatives serving in the Gulf and the ship's company. The reception would be held at the World Congress Centre.

The public would also have the chance to demonstrate their appreciation to the service people when the destroyer Brisbane, with 40 Victorian aboard, docks at St Kilda Pier on Friday, July 5.

The following day's race meeting at Flemington would also pay tribute to the Gulf effort with individual races named after vessels which served in the Gulf.

"I am delighted to announce that the Navy has agreed to our requests for a ship to visit Melbourne to give Victoria its opportunity to say thank you to the Gulf service personnel," Mr Kennett said.

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A Naval officer described by the Minister for Defence, Senator Robert Ray, as being "famous right throughout the Middle East for methods that have achieved results," will be the Australian Defence Force's new head of recruiting.

Captain Sloper also won the Duke of Kent Sword for efficiency, seamanship, equipment reliability and technical training of RAN ships in 1990.
The Gulf War — Maritime Aspects

The New South Wales Division of The Navy League in conjunction with The Company of Master Mariners of Australia arranged a Presentation on the above subject on Tuesday, 21 May at the Masonic Centre in Geelong Street, Sydney, when some 140 people from all walks of life attended a most stimulating evening.

The Presentation was opened by Rear Admiral Andrew Robertson, a Federal Vice President of the League, Mr Ian Harper, a former Ambassador to Saudi Arabia and Kuwait, with 16 years experience in Foreign Affairs and trade matters in the area, then set the scene with a talk on strategic and international policy aspects of the Gulf War. This was followed by Captain Cam Watson, Master of the MV NIVOA, a 124'000 tonne Australian flag Shell tanker, who spoke on "Experiences of a Tanker Master".

After supper, Rear Admiral Ken Doonan, the Maritime Commander Australia and Commodore Don Chatman, the Task Group Commander of the first Australian deployment in the Gulf, spoke on Maritime Activities in the Gulf Area.

Captain Norm Mackie, Sydney Branch Master of The Company of Master Mariners, and Rear Admiral Doolan, Armoured Forces, concluded the evening.

Some matters which were covered included the limited warning received by Australia of the outbreak of a major War involving the most modern weaponry; the speed of deployment of our Naval forces and the considerable efforts made to fit urgently needed communications and other equipment; the fact that only four of our warships were equipped with close-in missile weapon systems which was a major factor in the choice of the warships which were deployed (HMAS BRISBANE was subsequently fitted with a Phalanx system taken from the frigate under construction in Melbourne, to enable her to take part in the second deployment); the dangers faced by Australian merchant ships, particularly in the earlier Iran/Iraq War, in which the Australian Government seemed to be uninterested in the defence of its merchantmen, and other nations would not accept the tasks of escorting them; the success of command and control arrangements organised among the various national Naval forces present; the problems of intercepting and searching large and uncooperative ships and the success of the air effort while land-based Air Forces were rapidly built up.

Battle of The Coral Sea Conference

Sydney, 7-10 May 1992

The Australian National Maritime Museum will hold its first major conference from 7 to 10 May 1992, to commemorate the 50th anniversary of the Battle of The Coral Sea.

The conference and its temporary exhibition, to be held in the newly-opened museum in Sydney's Darling Harbour, will be part of an Australia-wide series of Coral Sea commemorative events during the first ten days of May 1992.

Both museum events are being sponsored by the USA Bicentennial Gift, and forms part of the public programs of the USA Gallery, which commemorates Australian-American maritime relations.

Only five months after the opening of the Pacific War, the Battle of The Coral Sea was fought between ships of the Japanese and Allied navies from 8-8 May, 1942. The battle took place in the Coral Sea, off the coast of Australia. The battle was one of the most crucial points of the war in the Pacific.

Historically, it was the first naval battle fought entirely by aircraft, without the ships ever sighted each other. Strategically, it was the first major battle of the war with Japanese air raids on Darwin, it was the first time since British colonisation that Australians lived in real fear of imminent enemy invasion.

Conference sessions will focus on the battle itself, its strategic significance, its effect on Australians, and its symbolic meaning for US-Australian bilateral relations then and now. Speakers are being sought from Australia, the USA and elsewhere.

The fall conference program will be available later this year. For further details, intending speakers and participants can contact:

John Wex, Senior Curator, USA Gallery
Australian National Maritime Museum
381 Macquarie Street, Sydney, NSW 2000 Australia
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SAFETY BY SEA

The Navy, July-September, 1991

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On March 22, 1991, the patrol boat HMAS SU880 on 16 March, 1991

Eleven Indonesian fishing boats towed in to Darwin by the patrol boat HMAS SU880 on 16 March, 1991.
Forty-five tons of naval hardware was uplifted from the former destroyer escort HMAS PARRAMATTA, on Wednesday, 10 April.

During the moring the ship’s twin 4.5 inch gun turret was “blasted” from its “home” for the past 30 years and lifted by crane for transport up harbour to the Navy’s Spectacle Island Historical Repository, a short distance from the mouth of the Parramatta River.

The removal operation began at Garden Island at 8.45 am with the turret placed on Spectacle Island as its major outdoor exhibition at 11.00 am.

During its 30 years aboard HMAS PARRAMATTA the gun provided the main anti-ship and bombardment weapon and was manned by a crew of 6 men. Its rate of fire was 20 rounds per minute with a maximum range of ten nautical miles. PARRAMATTA was decommissioned by the RAN on 11 January, 1991.

Spectacle Island, the home of many of the Navy’s artifacts, is a storehouse of maritime memories. Included in the collection are relics, flags, photographs, ships’ badges and battle honours, uniforms plus various weaponry beginning with the Boxer Rebellion in 1900.

Another building has been devoted to a collection of naval paintings, the development of naval aviation and women in the RAN.
The reform process has been slow and progressive, evidenced by the steady reduction in costs and improvements in efficiency. Companies, port authorities, importers and unions have worked together to streamline processes, reduce waste, and improve productivity.

The government's WIRA initiative has been successful in certain areas. The reduction in costs has been significant, but progress has been uneven. Some ports have made substantial improvements, while others have lagged behind.

National income is expected to increase as a result of these reforms, with a corresponding reduction in the balance of trade. However, some critics argue that the benefits are not being distributed evenly and that more needs to be done to address the needs of the workforce.

The government is committed to seeing the reforms through, and there is a sense of urgency to move forward and achieve the desired outcomes. However, there are still challenges to overcome, and the pace of change may need to be accelerated to meet the country's economic goals.

In conclusion, the reform process has been a significant step forward for the maritime industries. While there have been some successes, there is still work to be done to fully realize the benefits of these reforms.

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50TH ANNIVERSARY –

**Post World War Two**

With the end of World War II, the full implications of the 1941 change in status from the New Zealand Division of the Royal Navy to the Royal New Zealand Navy became apparent; the New Zealand Naval Board was confronted with the problems of the foundation and development of the first peacetime New Zealand Government controlled and operated Navy.

Demobilisation had to be expedited, and at the same time officers and ratings had to be found to man HMSN ships and establishments.

In 1945, on the close of hostilities, the cruisers COLUMBIA and Gambia, back from Japanese waters, reverted to the Royal Navy. They were replaced by the light 'Dido' class cruisers BELLONA and BLACK PRINCE (5,770 tons) on loan to New Zealand.

Although permanent and short-term commissions were granted to a number of Reserve officers, and many 'hostilities only' ratings joined the peacetime Royal New Zealand Navy, the transition period from war to peace necessitated placing in reserve all ships, many for disposal, with the exception of the cruiser BELLONA and corvette ARBUTUS and various small auxiliary craft.

**Six Frigates Purchased**

The post-war Royal New Zealand Navy began to crystallise early in 1946 when six LOCH class frigates were bought from the United Kingdom Government.

Designed for anti-submarine, convoy, and escort duties, Britain's modern LOCH class frigates earned a fine reputation against German U-boats just after the Normandy invasion. They also did good work protecting the North Russia convoys. The following LOCH class frigates were selected and renamed after New Zealand lakes:

- HMSN LOCH SHIN
- HMSN LOCH ACHRAY
- HMSN LOCH MORLECH
- HMSN LOCH ECK
- HMSN LOCH ACHANALT
- HMSN LOCH KATRINE

Although recruiting in New Zealand had been satisfactory, it was recognised that the training of tradesmen would take some time. Hence, the LOCH class frigates were commissioned by modernisation and refit. For instance, after modernisation and refit, SHECRA was commissioned in 1947.

**Survey Ship**

LACHLAN, the first and last vessel of the 'Dido' class, was transferred to the New Zealand Ministry of Works and Transport in October 1949. The vessel was not named. She was converted to a refit and accommodation barge and is still in use in this role.

Training Ships

The Navy has had a number of training ships since the end of the Second World War. The first was HMSN KIWI, which served as training ship to give annual sea training for the Royal New Zealand Volunteer Reserves from Auckland, Wellington, Christchurch and Dunedin. She was followed by her sister ship HMSN TUI, which remained in service until 1955 when she was converted to a fleet auxiliary.

**Australian Minesweepers**

On 5 March 1952 it was announced that the Australian Government had made a gift to the New Zealand Government of the four fleet minesweepers, INVERELL, KYLIE, STAWELL and ECHUCA. They retained their original names in commemoration of the gift and in honour of the Australian towns from which they were named. The ships were 'BATHURST' class minesweepers with a displacement of 650 tons and were 162 ft long. They were built in Australia during the war. The minesweepers were brought forward from reserve in Australia and sailed to New Zealand for modernisation and refit. SHECRA was commissioned in 1947.

**Foreign Contribution**

Three days after the New Zealand Government decided to contribute to the United Nations naval forces in Korea, the first two LOCH class frigates sailed. They were HMNZS PAUKI and TUTIRA, and they left Auckland on 1 July 1950. On 1 August 1950 they reached Sasebo, and three hours after their arrival sailed again with a supply convoy.

From then until the cease fire on 27 July 1953 the Royal New Zealand Navy maintained two frigates continuously in the area.

This effort involved all six frigates of the RNZ and eight years of duty. It also involved approximately one-half of the Navy's average strength during the period of hostilities.

After the cease-fire New Zealand's naval contribution was reduced to one ship — usually a frigate but occasionally a cruiser — with a second available although not stationed in the area. In addition, the area of operation was widened by attaching the ship to the Royal Navy's Far East Fleet as part of the Commonwealth Strategic Reserve in South-East Asia.

**Australian Minesweepers**

On 5 March 1952 it was announced that the Australian Government had made a gift to the New Zealand Government of the four fleet minesweepers, INVERELL, KYLIE, STAWELL and ECHUCA. They retained their original names in commemoration of the gift and in honour of the Australian towns from which they were named. The ships were 'BATHURST' class minesweepers with a displacement of 650 tons and were 162 ft long. They were built in Australia during the war. The minesweepers were brought forward from reserve in Australia and sailed to New Zealand for modernisation and refit. SHECRA was commissioned in 1947.

**Survey Ship**

LACHLAN, the first and last vessel of the 'Dido' class, was transferred to the New Zealand Ministry of Works and Transport in October 1949. The vessel was not named. She was converted to a refit and accommodation barge and is still in use in this role.

Training Ships

The Navy has had a number of training ships since the end of the Second World War. The first was HMSN KIWI, which served as training ship to give annual sea training for the Royal New Zealand Volunteer Reserves from Auckland, Wellington, Christchurch and Dunedin. She was followed by her sister ship HMSN TUI, which remained in service until 1955 when she was converted to a fleet auxiliary.

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In 1961 BLACK PRINCE was returned to the control of Admiralty which declared her surplus. She was sold to Far Eastern ship-breakers and towed away from Auckland.

ROYALIST was decommissioned in March 1960 and was sold to a Japanese company for scrap in December 1967 and towed from Auckland in January 1968.

**Antarctic Supply Ships**

The Royal New Zealand Navy accepted a major role in the New Zealand Trans-Antarctic Expedition; it agreed to take the expedition to McMurdo Sound, to help erect Scott Base and supply it, and to provide the Chief Radio Officer.

In 1956 the New Zealand Government purchased the Royal Research Ship JOHN BISCOE as the expedition supply ship. She was commissioned as HMNZS ENDEAVOUR and arrived in New Zealand on 20 October 1956.

ENDEAVOUR made her first voyage to McMurdo Sound in the summer of 1956 when she took in men and supplies for the Commonwealth Trans-Antarctic Expedition and helped establish Scott Base. She returned the next year on bringing back Sir Vivian Fuchs, Sir Edmund Hillary and members of the expedition. ENDEAVOUR made three more voyages to the Antarctic with stores and to make extensive geographical cruises before it was decided that it was no longer economic to refit her for the task service of the southern ocean. She was sold in 1962 and replaced by a Patapsco-class tanker, the USS NAMAKAGON, from the United States.

**The Indonesian Confrontation**

Two wooden-hulled Ten-Class minesweepers were commissioned into RNZ Service in Singapore in 1963. These were HMS HICKLETON and HMS SANTON and were permanently stationed in Singapore manned by regular and volunteer reserve crews. They were used on anti-infiltration patrols between Malaysia, Singapore and Indonesia with the Royal Navy 11th Minesweeping Squadron. Both vessels returned to the United Kingdom at the end of 1966 and were paid off into reserve in 1967.

**Anti-Submarine Frigates**

In October 1956 the Government announced its intention to order two fast anti-submarine frigates of the White-class for the Navy. Orders were placed with J.L. Thorneycroft at Southampton and J.S. Thorncycroft at Southhampton. In 1966 and in late 1968 the order was placed for the WRNZNS. In both cases the frigates were built at Yard's at Canada and the United States during the early 1940s. Built by Brooke Marine Limited in Lowestoft, England, the four patrol craft of this class were commissioned in February and July 1975 and sailed out to New Zealand as dock cargo on the heavy lift ship STARMAN. Their primary role is fishery protection and resource duties around the New Zealand coast. The four craft were named after New Zealand lakes and also commemorate the Loch-Class frigates HAWEA, PUKAKI, TAUPO and ROTOITI which served the RNZN between 1948 and 1966.

**New Patrol Craft**

In the early 1970s, after detailed study by Naval Staff, approval was received for the construction of four 107 feet steel patrol craft to replace the Harbour Defence Motor Launches built in Canada and the United States during the early 1940s. Built by Brooke Marine Limited in Lowestoft, England, the four patrol craft of this class were commissioned in February and July 1975 and sailed out to New Zealand as dock cargo on the heavy lift ship STARMAN. Their primary role is fishery protection and resource duties around the New Zealand coast. The four craft were named after New Zealand lakes and also commemorate the Loch-Class frigates HAWEA, PUKAKI, TAUPO and ROTOITI which served the RNZN between 1948 and 1966.

**New White Ensign**

The Royal New Zealand Navy hoisted its own White Ensign on 20 June 1968. The
The Navy, July-September, 1991

New ensign, of the same design as the New Zealand blue and red ensigns, but on a white background, had received the approval of Her Majesty The Queen.

The main reason for the change was the growth and individuality of the Royal New Zealand Navy and the inescapable requirement for the Navy to operate increasingly apart from the British Royal Navy.

The White Ensign had been served proudly and well, first by the New Zealand Division of the Royal Navy and subsequently by ships and men of the Royal New Zealand Navy.

The date when the new White ensign was first flown coincided with the 47th anniversary of the formation of "The New Zealand Division of the Royal Navy" authorised by an Order in Council dated 20 June 1921.

HMNZS Tui

HMNZS TUI was leased to the New Zealand Government by the American Government in July 1970 and, after a short refit in Brooklyn, New York, was commissioned into the Royal New Zealand Navy on 11 September 1970. She works primarily on the research programme of the Defence Scientific Establishment.

Before her transfer, she was attached to the United States Navy's Military Sea Transportation Service (MSTS) under the name of CHARLES H. DAVIS.

The ship was specifically designed as a specialised oceanographic research vessel and was launched in June 1962.

HMNZS TUI is employed on oceanographic research in conjunction with the Department of Scientific and Industrial Research and the Defence Scientific Establishment.

To enable a wide range of trials and research to be undertaken, special deck machinery has been fitted, including winches, a large crane, electrical cable handling facilities and a special davit on the stem. A unique feature of the ship are two transducer tubes, one metre in diameter, which extend from the upper deck right through the hull and open to the sea at the bottom.

TUI's normal area of operation is around New Zealand, Australia, New Caledonia, Fiji and the Cook Islands.

HMNZS Monowai

By the early 1970s it was realised that the existing hydrographic survey ship, HMNZS LACHLAN, was nearing the end of its sea-going life. Modern technology also made available a large array of sophisticated survey equipment which, if to be used effectively, would have to be installed in a modern ship. After evaluation, the Government transferred the inter-island trader MOANA ROA to the RNZN in 1974 for conversion to a specialist survey ship.

In 1975 HMNZS MONOWAI was steamed back to Scotland where she was first built in 1960 and handed over to Scott Lithgow Drydocks for refit and conversion. The conversion into one of the most modern vessels of its type involved total refit and extension of accommodation areas, adding extra surveying office space and store room space, fitting the latest surveying equipment available at the time, adding a helicopter deck and hangar in addition to upgrading all engineering equipment throughout the ship. In the course of the conversion both main engines were completely rebuilt and upgraded.

HMNZS Monowai was commissioned on 1 October 1977 in Scotland prior to returning to New Zealand. The ship carries two 10.5 metre specialist survey boats.

New Zealand Built Craft

A total of seven vessels have been built for the RNZEN by Waitemata Engineering Company during the late 1970s and early 1980s. The first of these was the diving tender MANAWANUI. All vessels have the same hull design and machinery, being 27 metres in length. MANAWANUI has since been replaced and renamed HMNZS KAUH for use by the training establishment HMNZS TAMARI for seamanship and navigation training.

Two inshore survey craft, HMNZS TAKAPU and HMNZS TARAPUNGA, were commissioned in 1980. They are designed to work independently or with HMNZS MONOWAI and carry an array of sophisticated hydrographic survey equipment.

Four inshore patrol craft have been built for use with each of the volunteer reserve divisions. HMNZS HINAU is attached to NGAPOA in Auckland, HMNZS WAKAKURA to the Wellington division OLOPIERT, HMNZS KIWI to PEGASUS in Christchurch, and the Dunedin division use HMNZS MOA.

Replacement Frigates

For some years studies had been carried out into suitable replacements for HMNZS OTAGO and HMNZS Taranaki whose hulls were now nearly 25 years old, although a bold plan was approved to modernise Taranaki with a gas turbine power plant this never eventuated. In 1981 the British Government offered the RNZN the opportunity to purchase two Leander-Class frigates currently operated by the Royal Navy. This offer was accepted and HMNZS TARANAKI was formally decommissioned in June 1982 and broken up for scrap in Auckland.

To replace the two type 12 frigates the RNZN purchased HMS BACCHANTE and HMS DIDO, complete with Wasp helicopters. These two frigates were renamed HMNZS WELLINGTON and HMNZS SOUTHLAND respectively. HMNZS SOUTHLAND underwent a refit by Vosper Thornycroft in the United Kingdom prior to sailing for New Zealand.

HMNZS OTAGO was decommissioned in November 1983 and after being stripped of all essential equipment, was subsequently broken up in 1987. This gave the RNZN a combat force of four Leander-Class frigates with the advantages of commonality but the problem that all were approximately the same age and would require replacing as a total frigate force in the 1990s. To overcome this a comprehensive modernisation was carried out to HMNZS WELLINGTON after arrival in New Zealand by the Naval Dockyard in Auckland.

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By PAUL SILVERSTONE
Published by: Arms and Armour Press
Review Copy from: Paul Silverstone
Price $24.95
Reviewed by: Ross Gillett

The Royal Navy at Malta
Vol 1 1939-1959
By PAUL SILVERSTONE
Published by: Arms and Armour Press
Review Copy from: LCDR BEN WARLOW
Price $59.95
Reviewed by: ROSS GILLETT

The T Class Submarine, subtitled The Classic British Submarine, is the story of the T Class in service with the Royal Navy from 1918 to 1977. Following the commissioning into Royal Navy service of the nuclear powered submarines and the Oberon class diesel boats, the Ts of the 1950s were broken up, but some were sold aboard to serve until 1977. The T Class Submarine spans 150 pages and illustrated by more than 200 black and white photographs. Well recommended.

US Navy 1945 to the Present
By PAUL SILVERSTONE
Published by: Arms and Armour Press
Review Copy from: Paul Silverstone
Price $24.95
Reviewed by: Ross Gillett

An enlarged version of the Petty Officer series, this book is a collection of 180 photos all with extensive captions. The illustrations are arranged chronologically with the pages devoted to brief technical details of the major USN units of period since 1945. Although reproduction of some of the photos could be better, the overall book is well presented and provides good reading. As well as portraying the ships many incidents of the post war period are highlighted including the capture of the PUEBLO in 1968, Korea, Vietnam, onboard casualties and groundings.

The Hybrid Warship
By R.D. Layman and S. McLaughlin
Published by: Conway Maritime Press

The Hybrid Warship chronicles the 70 year old quest for a naval unit with big guns and air power that would be more cost-effective than separate battleship and aircraft carriers. Some of the more famous attempts to create such ships included HMAS FORCOURT in the Great War, the Japanese
The field guns were to provide support to the Japanese Army's Kokusai Ki-76 liaison and artillery-spotter plane, a light, two-place 310hp highwing monoplane with fixed landing gear, greatly resembling in form and function the German short take-off and landing gear. By mid-1944, as the possibility of landing operations decreased and the toll of aircraft from anti-submarine warfare increased, the aircraft was redesigned and built with a different configuration. The aircraft became a 240hp two-place reconnaissance and artillery-spotter type, similar to the American Kiell-D-Austreg, a single example of which had been imported in 1939. The shipboard version was designated the Ki-1s to permit it to carry two 1320lb depth charges. In total, 3294 Ki-1s were built, modified to carry two 1320lb depth charges for anti-submarine warfare. They were reportedly fitted with arresting hooks, but it is not known if they attempted landing operations. Their extensive system of flaps probably would have allowed touchdown, but the approach would almost certainly have been from the bow, since the high deck masked the after end of the flight deck. By mid-1944, as the possibility of landing operations decreased and the toll taken by US submarines rose, the army allowed touchdown, but the approach would almost certainly have been from the bow, since the high deck masked the after end of the flight deck.

In her new guise, which superseded an earlier attempt to convert her to a full flight deck carrier, Akitsu Maru carried out only a few operational cruises before being sunk by the US submarine Oueretik in the Tsushima Straits on 15 November 1944. The Japanese Army's third hybrid, Komuro Maru, was laid down on 15 August 1944 as a standard M type cargo-transport, while building it was proposed to alter her to an escort carrier, equipping her with the Kaikyo Ka-1 Autogiro, which thus became the first aircraft of its type to see operational service with the Japanese fleet. The aircraft was a 240hp two-place reconnaissance and artillery-spotter type patterned after the American Kiell-D-Austreg, a single example of which had been imported in 1939. The shipboard version was designated the Ki-1s to permit it to carry two 1320lb depth charges. In total, 3294 Ki-1s were built, modified to carry two 1320lb depth charges for anti-submarine warfare. They were reportedly fitted with arresting hooks, but it is not known if they attempted landing operations. Their extensive system of flaps probably would have allowed touchdown, but the approach would almost certainly have been from the bow, since the high deck masked the after end of the flight deck. By mid-1944, as the possibility of landing operations decreased and the toll taken by US submarines rose, the army allowed touchdown, but the approach would almost certainly have been from the bow, since the high deck masked the after end of the flight deck. By mid-1944, as the possibility of landing operations decreased and the toll taken by US submarines rose, the army allowed touchdown, but the approach would almost certainly have been from the bow, since the high deck masked the after end of the flight deck.

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BOOK REVIEWS continued

through both world wars. During the "Battle of Jutland", WARSPITE was hit 29 times by enemy fire. Details of these hits together with personal reminiscences and well drawn plots of the action gives the reader an amazing insight into that controversial battle.

Details of the many alterations and additions between the wars are well recorded including the major reconstruction carried out between 1934 and 1937 that drastically changed WARSPITE's appearance.

During the Second World War, WARSPITE operated off Norway where she had a very active role during "The Battle of Narvik", served in the Mediterranean where her actions included "Calabria", "Bardia", "Cape Matapan" and "Crete". Off Cude, the ship's luck ran out and was struck by a bomb from a German Messerschmitt Me 109 fighter-bomber with the bomb penetrating the forecastle and exploding between decks, this necessitated a refit in Bremerton, USA. Details of the ship's war modifications are well tabulated as a result of this refit. Following refit in January 1942, WARSPITE was assigned to the Eastern Fleet, visiting Sydney, Fremantle and Colombo, where Admiral Sir James Somerville, C-in-C, Eastern Fleet hoisted his flag on the ship. After a year with the Eastern Fleet, WARSPITE was recalled to home waters and served with distinction, the ship was present at the surrender of the Italian Fleet and had an active role in "D Day", the Allied invasion of France on June 6, 1944.

By early 1945 the thirty year old WARSPITE was showing her age with worn armament and machinery and with the end of the war in Europe in sight it was decided to pay the "Old Lady off". When the time finally came for the ship to be towed to the breakers in 1947, WARSPITE would not go easily as during her final tow a gale was experienced and captain decided the ship was finished and sunk in place at the entrance to the harbor. By early 1945 the thirty year old WARSPITE was showing her age with worn armament and machinery and with the end of the war in Europe in sight it was decided to pay the "Old Lady off". When the time finally came for the ship to be towed to the breakers in 1947, WARSPITE would not go easily as during her final tow a gale was experienced and captain decided the ship was finished and sunk in place at the entrance to the harbor.

The Heroes of Rimau, first published in 1989, after a thirty-one year search, Major Tom Hall, with the assistance of writer Lynette Silver, has overturned the official version and unveiled the truth. Aided by thousands of Japanese and Allied documents and by the first-hand accounts of several Indonesians and Malays, sole witnesses to the events of 1944, they have established the fate of every member of the party and unravelled the story of The Heroes of Rimau - a story that has for forty-five years been all but lost, distorted by hearsay and fantasy, by military cover-ups and conspiracy, by official bungling, ineptitude and apathy. The heroes of Rimau not only chronicles a tragic tale of extraordinary daring in the face of overwhelming odds - a gripping tale of inspired courage, self-sacrifice and eventual tragedy - it also exposes the appalling sequence of events which has, until now, resulted in the shameful suppression of the truth about one of the most amazing stories to emerge from World War II.

THE HEROES OF RIMAU

by LYNETTE RAMSAY SILVER

From The Research of MAJOR TOM HALL

Published by Milner Publishing

On September 11, 1944, the British submarine Porpoise slipped quietly from Fremantle Harbour, bound for Indonesia. It was carrying the twenty-three Australian and British members of Operation Rimau (pron. Ree-mow, rhyme with 'how') who, under the leadership of the remarkable Lieutenant-Colonel Ivan Lyon of the Gordon Highlanders, intended to repeat the successful Jaywick raid of 1943 by blowing up sixty ships in Japanese-occupied Singapore Harbour. Nineteen days later, the partial success of the operation did not occur, the submarine commander farewellled the raiders at Perhentian Island, promising to return to pick them up in thirty-eight days' time. A handful of Japanese and Malays and the conquering Japanese were the only people ever to see the twenty-three men again.

According to the scant official post-war record, the mission was an utter failure. All of the party were captured or killed - ten of them beheaded in Singapore only five weeks before the Japanese surrender in, it was claimed, a ceremonial execution. The fate of the other eleven remains officially unknown.

After a thirty-one year search, Major Tom Hall, with the assistance of writer Lynette Silver, has overturned the official version and uncovered the truth. Aided by thousands of Japanese and Allied documents and by the first-hand accounts of several Indonesians and Malays, sole witnesses to the events of 1944, they have established the fate of every member of the party and unravelled the story of The Heroes of Rimau - a story that has for forty-five years been all but lost, distorted by hearsay and fantasy, by military cover-ups and conspiracy, by official bungling, ineptitude and apathy. The heroes of Rimau not only chronicles a tragic tale of extraordinary daring in the face of overwhelming odds - a gripping tale of inspired courage, self-sacrifice and eventual tragedy - it also exposes the appalling sequence of events which has, until now, resulted in the shameful suppression of the truth about one of the most amazing stories to emerge from World War II.

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The Navy League of Australia

Nuclear-Powered Submarines for the Royal Australian Navy?

A paper written for The Navy League of Australia
by John C. Grover, OBE, BE, MSc, FRGS, FIEAust, FIMM, FAusIMM, FGS
with Rear-Admiral Andrew J. Robertson, AO, DSC, RAN (Retd)
published by The League in conjunction with The Navy magazine of July/September 1991
This paper is based on a presentation by John Grover to the Sydney Branch of the Institution of Engineers Australia on 22 November 1989.
INTRODUCTION

What are the facts about Nuclear Energy?

While the nuclear-powering of ships is an issue which can be discussed on its own merits, it is often discussed in the context of nuclear power stations as a whole. It therefore seems appropriate to consider briefly the nuclear power question before moving onto the subject of power for warships.

A kilogram of washed Australian coal averages 36 megajoule units of energy. Oil has roughly 38 units. But a kilogram of natural uranium burned in the fast neutron breeder reactors of tomorrow would give more than 24 million megajoule units per kilogram. The difference is 35 versus 24,000,000 units of energy per kilogram.

Thus very small small quantities of uranium, easy to transport and store, can replace huge quantities of coal or oil for the production of electricity in power stations or for powering ships.

While acknowledging the vital need for very high standards of design, quality control, construction, training, operation and safety in nuclear power stations or nuclear-powered ships, this technology has considerable advantages over coal-fired installations, not only with respect to the bulk of the feedstock used, but also with respect to pollution.

The results of failure to observe high safety standards are obvious, particularly as shown by the Soviet disasters of Chernobyl and later Ust-Kamenogorsk, and in Soviet submarines.

It must be remembered, however, that nuclear facilities are not alone in posing latent hazards. There have been major disasters in other areas of production where appropriate standards have not been observed, for example in chemical works (such as at Bhopal in India), and in coal mine explosion disasters all over the world.

While much effort is being devoted to reducing pollution from coal, the problem is formidable as most 1000 megawatt coal-fired power stations use about 400 tonnes of coal per hour, producing the following pollution burned in 4500 tonnes of air:

- carbon dioxide: about 1200 tonnes per hour;
- nitrogen oxides: as from 200,000 motor cars running continually;
- organic compounds: about 50, some known to be carcinogens;
- radioactive isotopes: about 50, including highly toxic Protactinium 231 and Radium.

Nuclear power stations produce no such pollution and the radioactivity therefrom is much less than from coal-fired stations. (The design allows for the radioactivity in the event of mishaps to be confined to the containment building. Only the Russians have been building stations generally without such reinforced concrete buildings, until recent years.)

While oil, being a liquid, is more flexible as an energy source than either coal or uranium because it can be readily piped, it is also polluting, but not quite as seriously as coal.

However, our oil production is set to decline substantially during the 1990s while our consumption increases about 2% annually (APEA 1990).

In spite of recent finds on the NW Shelf of Western Australia, more discoveries are needed if Australia is to be even 50% self-sufficient in the year 2000. We could be in serious trouble by then.

On the other hand Australia has an abundant supply of uranium (as it has of coal), a good reason for discussing nuclear energy and its applicability to us, for part of our future power production, particularly in remote areas, and for ship propulsion.

Australia's uranium has more energy potential than all the oil of Saudi Arabia, yet most of it lies undeveloped.

Despite Chernobyl the world's nuclear power-station development continues apace. World-wide, 19 large nuclear reactors went onto electricity grids in 1989. Some are being decommissioned after 30 years or so. The world total is now 422 with 68 more under construction and another 83 under firm plan (March 1991).

France now has 57 reactors which produce between 75 and 80 per cent of her electricity, and supply other European countries including Britain. This is a remarkable achievement, without major incidents. (Eight more reactors are under construction.)

In our general region Japan has 40 operating, 12 more under construction, 15 more under firm plan, for a total of 67.

China has three reactors building and four building under plan. Taiwan has six reactors operating and two more planned, totalling eight.

South Korea has nine operating, two more building and another three planned, totalling 14.

India has seven operating, seven more building and 12 more under firm plan, for a total of 26.

Indonesia's first nuclear power station is scheduled for construction in 1995.

While Sweden had ideas of phasing out nuclear power stations, the great increase in the price of oil following the invasion of Kuwait has caused a rethink of this policy.

But Australia has so far not embraced nuclear energy. We are therefore to a large extent cut off from this very important technology of the 20th century and run the risk of technological decline in comparison with our trading partners.

While this is of significance to national development, of importance also is the use of nuclear power for the propulsion of warships.

By nuclear propulsion is meant the use of nuclear fuel to heat water to produce steam which drives a turbine in the same way as a coal-fired or oil-fired ship. The nuclear argument is thus about heating water for steam and not about nuclear weapons.
The Naval use of Nuclear Power for Ship Propulsion

The historic message from US Submarine Nautilus. "Under way on nuclear power" came in 1955, more than 35 years ago. Voyages under the North Polar ice-cap signalled a world moving into the nuclear age.

The nuclear-powered submarine's submerged speed of 25+ knots could be sustained indefinitely with almost total discretion. Air independence made snorkel mast obsolete, for Nautilus did not have to stop and raise such a mast to recharge her batteries. Better living conditions included virtually limitless fresh water from distillation, as well as air conditioning.

For the first time since the days of sail, nuclear power gave navies vessels whose range was limited only by the endurance of machinery, supplies and crew – and not by fuel.

Nuclear power for submarines has now been accepted by the USA, Britain, France, the USSR, China, India and probably Pakistan. Launched in 1960, Britain's first nuclear-powered submarine, HMS Dreadnought, displaced 4000 tons dived.

Her largest nuclear-powered submarines are the four Resolution Class carrying long-range ballistic missiles and displacing 3700 tons dived.

The Russian double titanium hulled Alpha Class SSN has a reported world record speed of about 40 knots submerged, and can operate at a depth of 700 metres. Built in the 1960s, it has several times the power of the US nuclear powered submarines (SSNs).

The largest submarines in the world are the Soviet nuclear-powered Typhoon Class, displaced 45,000 tons dived, each about half the size of the Battleship USS Missouri, a recent visitor to Sydney Harbour. 

Initially built around large reactors, nuclear-powered submarines were too large and too expensive for smaller nations to consider. So in 1955, the year of the Nautilus, France began thinking about nuclear power for the propulsion of smaller vessels comparable in size and cost with the newest designs of diesel-electric submarines.

A new nuclear boiler concept with its steam generator placed above and within the reactor achieved a silent primary water circulation by convection. For speeds up to 14 knots this eliminated the need for primary booster pumps, the major radiated noise factor in nuclear-powered submarines until then. It also occupied less space.

This concept has been proven in the Rubis, first tested in 1973, and in the Ankerhke, the latest fitted with updated technology and weapon and sensor systems. In the natural convection mode the submarine runs silent. The noise of reformation has been eliminated by electrical transmission the steam turbine drives alternators which power an electric motor on the propeller shaft.

The Rubis' reported top speed of about 25 knots submerged is, of course, less than that of the more powerful and larger British Trafalgar (5200 tonnes) and the US Los Angeles (7000 tonnes) class submarines. But 25 knots continuously is an enormous improvement over the limited endurance speed of the latest diesel-electric submarines.

The 48 megawatts nuclear reactor of the Rubis Class requires only about half the steam flow of some of the older boats. Depending on operational speeds, refuelling would not be needed for years – perhaps once in the submarine's lifetime of about 50 years.

In 1985 the Rubis steamed submerged from Toulon via the Cape of Good Hope to Noumea in New Caledonia, where her maintenance was topped after a few weeks. But no maintenance was needed on the nuclear plant side, and only minor attention to the non-nuclear steam turbine circuit, which was not beyond the resources of the crew. The Rubis then steamed submerged to Tahiti, and thence to Toulon 35 days later.

In her underwater circumnavigation she covered 32,000 nautical miles at a mean transit speed of 15 knots.

A diesel-electric submarine could not have undertaken this venture without support from shore-based or surface ships for refuelling and probably diesel maintenance. It would have taken perhaps three times as long.

For speeds up to 18 knots this eliminated the need for primary snorkel masts which were vulnerable to detection. However, normally they need to "snort" to raise the snorkel-mast - after about 12 hours to get air to the noisy fast-venting diesel engines in order to recharge batteries. Ventilation and replenishment of the atmosphere is a by-product of that action.

At a top speed of about 22 knots, modern diesel-electric submarine batteries last about one hour – from Garden Island they would be able to reach Palm Beach with a flat batteries. The snorkel system in the newer U-Boats reduced the detection rate. But the overall figures are revealing: of the 842 conventional diesel-electric submarines built up to now, 781 were lost – 91%. Their crews suffered 85% losses.

The modern diesel-electric submarine, while of better endurance and armament, and much quieter, still has serious limitations: Short continuous submerged speed and a significant "indiscernible ratio".

The Swedish Kockums diesel-electric submarines now being partly built in South Australia will be among the best equipped and most powerful diesel-electric submarines in the world. Additionally, air-independence is a possible development, using a Sterlings Heat Engine and liquid oxygen supply – some of which is used for air purification in conjunction with carbon dioxide removal.

Invented by a Scottish Presbyterian Minister more than a century ago, the Stirling Engine runs on a mixture of oils and carbon dioxide. Invented by a Scottish Presbyterian Minister more than a century ago, the Stirling Engine runs on a mixture of oils and carbon dioxide. Invented by a Scottish Presbyterian Minister more than a century ago, the Stirling Engine runs on a mixture of oils and carbon dioxide.
Given our two-coast defence policy, the great distances between our bases and our northern areas, and the ever-present possibility of last-minute decisions in a democratic society, this rapid reaction capability could be of great importance to Australia.

In addition, because of the speed of deployment, more time can be spent on patrol. Sustained silent speed means that larger areas can be patrolled in the same time as a slower diesel-electric submarine.

As a rough rule, to deploy two submarines continuously on patrol needs a total force of five nuclear-powered or eight diesel-electric submarines. Under some circumstances nuclear-powered submarines have a higher chance of survival than do diesel-electric submarines. For example, the higher speed of nuclear-powered submarines could sometimes enable them to outrun torpedoes fired at them. Similarly, provided conditions enable them to use their high speed, they can evade or escape more easily.

Objections to nuclear-powered submarines, highlighted in the press, state that they are "noisy" and "too large to operate in shallow waters". However, as the nuclear-powered submarine Rubis has shown, the problem of noise has been solved.

The Rubis Class nuclear-powered submarine can go anywhere a similar-sized diesel-electric submarine can go. It is neither noisy nor too large.

Nuclear-powered submarines are considered superior to diesel-electric submarines that the US Navy has refused to build any more of the latter for itself or for its Allies. (Other countries, however, continue to build them.)

The only war experience with nuclear-powered submarines was in the Falklands War. Britain’s nuclear-powered submarine HMS Conqueror steamed from the North Atlantic at high speed submerged for 6500 miles, then shadowed and sank a cruiser when ordered to do so. With others, she bottled up Argentina’s Navy for the rest of the war - a convincing demonstration of the speed of deployment, flexibility and deterrent power of nuclear-powered submarines.

Submerged for decades, scientific opinion is that they would not release fission products.

The corrosion rate with salt water exposed to the air might be a few millionths of an inch per year, but completely submerged it would remain intact indefinitely.

The Western countries’ design criteria are superior to those for their land-based reactors. It is hard to see how fission products could escape from the very thick special-steel reactor pressure vessel. (Soviet design standards in their earlier submarines seem to have been to some extent inferior to those of the US, Britain and France.)
What about Radioactivity Effects on the Crew?

Ambient radiation is continuously monitored in the USN. The total radiation exposure in 1983 for all US submariners was only 1/4 of that in 1968, as shown in Figure 6.

![Graph showing total radiation exposure of USN submariners from 1960 to 1983.](image)

This graph shows the total radiation exposure of both military and civil personnel in the US Naval Nuclear Propulsion Program from 1960 to 1983. In spite of the increase in nuclear-powered vessels from 10 to 142, the total radiation exposure of thousands of men was reduced from 20,000 man-rem's to 5000 man-rem's per year — a 75% reduction. Each successive program had successfully reduced the radiation effects further.

Radiation comes in three kinds. Alpha particles cannot penetrate a sheet of paper or your skin; beta particles will pass through your skin; gamma rays will penetrate deeply into concrete.

Effects on the Crew?

Reassuring with respect to radiation effects on crews.

Additionally, tenders or barges which service nuclear-powered vessels in port are shielded as are all nuclear support facilities.

In shore bases, radioactive materials are limited to a minimum number of places, and specific traffic routes have to be followed. An accountability system covers transport of nuclear materials outside the established facilities — to ensure that none is lost or misplaced.

From the foregoing US naval nuclear experience seems reassuring with respect to radiation effects on crews.

What about the Environmental Impact of Nuclear-powered Submarines?

The environmental impact of US nuclear wastes in all ports and harbours from 142 nuclear powered vessels, was less than 0.002 curies in 1983 — a remarkable achievement. (A curie is the radiation given off by a gram of radium.)

![Graph showing total radiation exposure of both military and civil personnel in the USN.](image)

Two-thousandths of a curie is so small that if it were possible to drink all this annual discharge of waters at once, one would not exceed the annual radiation exposure allowed to an individual nuclear worker.

Great improvements were made between 1961 (with 25 ships) and 1983 (with 142 ships) — the upper dotted line in Figure 7 gives numbers. The thousands of cubic feet per year of all kinds of waste are shown by the lower full line. It also represents a major achievement in mastering what was a new technology in the 1960s.

Monitoring is checked by the US Dept of Energy Laboratories, and the US Environmental Protection Agency (EPA), sampling independently.

Water with radio-nucleides is filtered through an ion-exchange resin bed to containers which are then carried ashore and again processed prior to re-use instead of being discharged. High quality water is produced.

In the 1960s millions of gallons of radioactive waters were discharged into the sea within 12 miles of harbours, but by 1973 this had been reduced to less than 25,000 gallons.

Releases at sea are now close to zero — very much less than recommended by the authorities (the Council for Environmental Quality, Marine Protection Law " and the National Research Council")

Of course, the sea is radioactive naturally, to the extent of about 390 picocurie units of radioactivity per litre, about the same as beer. (A picocurie = 10^-12 curies.)

Whisky is even more radioactive, 1200 picocurie units per litre, milk about 1400 and salted oil about 4900 picocuries per litre. Brazil nuts may have between 200 and 7000 picocuries per kilogram.

Everything we eat and drink is radioactive to some extent but in such small quantities that it is not harmful to us!

This evidence so far indicates that nuclear-powered ships have no discernible effect on the quality of the environment.

But what if, despite all the evidence of careful over-design, quality control and experience, the unthinkable should happen: an accident in port with a nuclear submarine's reactor?

All such marine reactors have supplementary alternate cooling arrangements.

Common sense arrangements limit the danger to the public. Nuclear-powered warships could be based away from centres of population — there is already one such suitable base in Western Australia.

The provision of tugs with trained crews to tow away damaged vessels to remote anchorages is clearly another sensible precaution.

Comprehensive and competent organisations in naval dockyards and bases with equipment, facilities, and trained staff to deal with nuclear matters would be a normal part of planning for operation and maintenance.
But What About Cost?

Definitive information on costs is always difficult to obtain, and there are different ways of measuring such costs. However, according to some sources the Swedish-designed diesel-electric submarines being assembled in South Australia were originally to have cost about 30% less than a small nuclear-powered submarine of the Rubis class built overseas.11

While the cost of a new Rubis/Anzac/Vertile Class submarine is not known accurately, given that the cost escalation of our own submarine building programme is likely, it seems a reasonable assumption that it would be comparable to that of a modern diesel-electric submarine fitted with a Stirling Engine built here.

There is also the possibility of acquiring surplus US or British submarines at a fraction of the cost of new vessels, in view of impending cutbacks overseas. Australia would need an Atomic Energy Authority responsible for advice on safety measures for the population and for the control and licensing of the nuclear energy activities by the RAN.

Appropriate infrastructure would also be needed, but this is not prohibitively expensive. After all, US Navy nuclear-powered submarines have been maintained from time to time at Cockburn Sound in Western Australia. To reduce infrastructure costs, submarines requiring refueling could be returned to the country of origin, noting that this might be only once in their lifetime.

But how will any additional cost be met, given the economic condition of the nation, failing defence allocations, and the announced re-organisation of our defence arrangements?12

Basically this comes down to the resolution of two priorities. Firstly, what priority the nation itself is prepared to give to long-term defence, and secondly, what priority should be given to the future provision of nuclear-powered submarines in the defence budget itself.

Clearly if the Government of the day gave either of these priorities sufficient emphasis, the money could be provided noting that it would not be required for some years, by which time the nation should have emerged from its current economic malaise.

Conclusion

There has been far too little informed debate on the advantages and disadvantages of nuclear power for submarines and ships of the Royal Australian Navy — in spite of 35 years of highly successful world experience with hundreds of nuclear-powered submarines and surface warships.

The considerations of cost, disposal of nuclear waste, infrastructure needed, environmental issues and safety seem solvable and certainly not beyond Australia's means. All warships, except submarines have inherent dangers from the weapons, ammunition, and the fuel they carry. However, with very exacting standards of design, quality control, construction and operation, nuclear warships have achieved high levels of safety. Similar considerations apply to nuclear power.

Given our immense Oceanic distances, our almost complete dependence on shipping for imports and exports, our developing maritime nuclear power, there is a convincing argument that Australia should acquire at least two small nuclear-powered submarines, and in due course consider the application of nuclear propulsion for surface warships.

Such submarines would augment our future force of six modern diesel-electric submarines for the tougher and more rapid deployment tasks in war, for which only nuclear-powered submarines have the needed capability. They would also ensure that our anti-submarine capability could be trained effectively.

Together with the new diesel-electric submarines, if effectively armed, they would provide a modest deterrent to possible foes — arguably the most cost-effective type of deterrence in manpower, capability and flexibility for an island nation.

While the maintenance of major defence changes must put in doubt the immediate possibility of new programmes, the building of an effective navy for the 21st century is a matter of major national security importance to an increasingly exposed and isolated island nation. This requires not only vision but a bipartisan consensus on decision-making and allocation of resources in future years.

In this rapidly-changing world, when self-reliance in defence becomes more important, one must seriously question whether, given the facts, Australia would really accept that its Navy should be deprived of modern and rapidly deployable submarines while at least two nations in our general region already possess such vessels.

So why has Australia not seriously considered the acquisition of Nuclear-Powered Submarines?

The failure to inform the public on nuclear power issues has been compounded by consistent measures to promote the emotional arguments, by confusion with nuclear weapons, and by official measures which have militated against a balanced perspective.

For example, the Cain Government of Victoria, soon after its first election to office, was reported as having instructed the Department of Industry, Technology and Resources to cease distributing to enquirers printed information on the peaceful uses of nuclear energy and return it all to the Uranium Information Centre.

Public enquiries were thereafter to be referred to the Movement Against Uranium Mining, The Australian Conservation Foundation and the Centre.

The “Victorian Government Nuclear Prohibitions Act” is still law, as is a similarly restrictive law in NSW initiated by the Wran Government, the “Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986” — which seems to outlaw uranium.

Training and Morale

Finally it must be remembered that one of the important tasks of submarines is to train our anti-submarine forces.

Since there are now so many fast nuclear-powered submarines in the world’s navies, even without some of our neighbours, it is essential that our forces (warships, submarines, naval helicopters, RAAF anti-submarine aircraft) be trained to detect and combat them.

Such training can only be done effectively for the total force if we possess nuclear-powered submarines ourselves, for their sustained high speeds offer a much more challenging problem for both RAAF and RAN anti-submarine forces than do diesel-electric powered submarines.

Such a decision would give a huge boost to morale, an incentive to service in our submarine forces, improve the retention rate of sailors, and provide the RAN with some real teeth.

Conclusions

1. The nuclear submarine project is at least two decades away from being realised.

2. Given the history of nuclear weapons, submarines are more cost-effective than reactors.

3. Given the political importance, the costs and dangers of new reactor technology, it is unlikely that nuclear power will move to the RAN.

4. Given the costs, risks and dangers of submarine acquisition, we should consider a modest submarine force.

5. A nuclear submarine project is not a cost-effective option.

6. Australia should consider acquiring a small nuclear-powered submarine.

7. Australia should consider acquiring a small nuclear-powered submarine.

8. A nuclear submarine project is not a cost-effective option.

9. Australia should consider acquiring a small nuclear-powered submarine.

10. Australia should consider acquiring a small nuclear-powered submarine.

11. Australia should consider acquiring a small nuclear-powered submarine.

ENDNOTES

(2) Commander N.S. Stewart, RN (retd), FINRA, MIA, Naval Nuclear Propulsion Program. Dept of the Navy, Washington, DC.
(3) Perhaps at half-life 15-year refit. The new core would not be dangerous. The used one would be kept in a pool of water, later trans-shipped in a water-cooled container, a well-organised procedure in ships regularly plying between Japan and Europe.
(6) It is misleading to compare a 2400 T diesel-electric submarine with a large American nuclear-powered submarine. Valid comparison is only possible between diesel-electric and the nuclear submarine having the same sized and shaped body, French calculations indicate that over 30 years the nuclear Rubis operation costs about 37% more than the diesel-electric equivalent. But the cost per day at sea over the same area at much greater speed is only about 3% more. The cost per square km patrolled is much less.
(8) The number of disintegrations per second being officially defined as 3.7 x 10^16.
(12) See 60 on ref.
(13) The Uranium Information Centre, GPO Box 1649N, Melbourne, Vic 3001.
(14) The refueling of facilities to a US Navy observer aircraft during the MX Missile tests in the Pacific.
(15) The refueling of docked facilities in NSW to some British warships.
(16) The tug backs after anti-nuclear demonstrations, when thousands of British sailors who had been invited to Melbourne’s Bicentennial Celebrations were unable to land.
(17) While some of these incidents have been related to the possession of nuclear weapons, there have been cases of allied nuclear-powered vessels being harassed.
(18) The Chief of the Defence Force had suggested that nuclear-powered submarines should be considered for the RAN according to a report in The Sydney Morning Herald of 16.5.88 (“Beazley sidesteps ‘or sub debate”). The Chief of Naval Staff had also argued for “a study of the nuclear-powered option” according to The Australian of the same date (“Hawke swamped by water hazards”).
(19) Possibly with Tomahawk weapons.
Fig 9: Detail of one of RUBIS's hull hatches being opened. The presence of these hatches allows maintenance and conversions to be performed without openings being cut in the pressure-resistant hull.

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<th>'Rubis'/Amethyst</th>
<th>'Trafalgar'</th>
<th>'Oberon'</th>
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<td>- max.</td>
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<td>97</td>
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Size comparisons of two nuclear-powered submarines with Oberon Class.
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Dear Sir,

In the review of "Battleship Warspite" there are a number of omissions and inaccuracies. The mention of damage to "Warspite" in Jutland is misleading in that she was struck 15 times by heavy shell - not 29. The other hits were by light calibre.

While it is true that she was badly damaged during the Crete campaign, she was much more severely damaged at Salerno when a Fritz radio guided bomb penetrated the deck armour and exploded in one of the boiler rooms, blowing a hole in the bottom while another damaged with a near miss. After a difficult journey back to Ramsgate for gun barrel replacement she was sent back to bombardment duty - at this stage she had only 3 turrets in operation and was running on three.

Again patched up, she was sent back to bombardment duty - at this stage she had only 3 turrets in operation and was running on three.

To continue with the "visits" theme, the NATIONAL PRESIDENT OF THE NAVY LEAGUE OF THE UNITED STATES, Mr. Alvin Cobb, accompanied by his wife, arrived in Australia in January in the course of a visit to a number of countries in our region. Mr. and Mrs. Cobb met Navy League Office bearers in Cairns, Sydney, Canberra, Melbourne, Perth and Darwin before moving on to Singapore.

Subsequently the writer and several others received invitations to attend the NULS annual convention at Adelaide in May, and in June a "strategy forum" at the Naval War College, Rhode Island. Unfortunately it was not possible for these invitations to be accepted but it is understood they are to be extended again next year.

The writer feels it is timely to comment on League matters again, starting with the video...

"THE SEA AND AUSTRALIA" is surely a success story. Conceived as an enjoyable way young Australians could discover the way the sea influences their lives, the video has now been supplied free of charge to over 2500 secondary schools throughout Australia.

Apart from the interest created among school students, one of the most gratifying features has been the support received by the Navy League from educational authorities nationwide.

Educational arrangements vary in Australia and in the South Territory. This has involved several "launches" several of which were attended by the writer, the last being in Darwin in July. On both occasions the League's initiative has been acclaimed by those present. A disappointing feature has been media disinterest, Darwin being an exception, with print and radio attention.

Indicative of the wider appeal of "The Sea and Australia", representatives of organisations present at launch functions, including members of the RAN, subsequently ordered copies of the video for their own purposes and these have been supplied at a reasonable cost. A limited number of these copies are still available and anyone interested should contact their local Navy League secretary, names and addresses are listed in the adjoining block.

DARWIN. As mentioned the writer recently visited the Northern Territory, his first visit for more than 30 years after he cares to remember. Darwin must surely be the most cosmopolitan city in Australia. Indeed one has the impression of more traffic between Darwin and Asia than with Southern Australia. The city's splendid shopping centres (and the casino) are a great attraction.

A steadily increasing Army and Air Force presence, together with a noticeable naval contingent which includes the hard-worked patrol boats, cause Territorians to be more conscious of the Services than other capitalists. The civil and military communities appear to be integrating extremely well.

A visit to the beautifully kept Adelaide River war cemetery was a sobering experience and one not to be missed by visitors to the Territory.

To sum up over the past few issues of THE NAVY the writer notes that foreign affairs and defence have been the topics discussed in the "presidential" part of Viewpoint. More than twelve months have passed since Navy League affairs received a mention and that concerned completion of the video "The Sea and Australia". The writer feels it is time to comment on League matters again, starting with the video...

THE NAVY LEAGUE OF NEW ZEALAND, which has been heavily involved in Sea Cadet activities for many years, proposes to broaden its interests and has invited the writer to be guest speaker at a conference to be held in Auckland in mid-October. This invitation has been accepted (although an invitation to fish in the icy waters of the South Island before returning is "un-heard").

These visits and invitations are mentioned as a reminder that Navy Leagues are active in many countries and our common interests provide an excellent opportunity for information exchanges and a better understanding of the problems that no country today is without. Not the maritime countries of which Australia is one.
Australia to continue Naval presence in the Gulf

Australia will continue its contribution to the Multi-national Naval Force (MMF) enforcing United Nations sanctions against Iraq, the Minister for Defence, Senator Robert Ray, has announced.

Senator Ray said the guided missile frigate HMAS SYDNEY will replace HMAS DARWIN deployed in the Arabian Gulf.

"HMAS SYDNEY will be deployed in the Red Sea where its presence will be particularly important to the UN operation," Senator Ray said.

"It is in the Red Sea where all the recent boarding operations have taken place."

Between June 4 and July 5 this year, 165 ships were boarded and 10 diverted.

Commissioned in 1973, HMAS SYDNEY is armed with a 76mm gun, Standard anti-air missiles, Harpoon anti-ship missiles, a close-in weapons system and carries a Seahawk helicopter.

Senator Ray said that Australia would continue to contribute to the Multi-national Naval Force as long as there was a special role to play in enforcing sanctions.

The sanctions will not be lifted until Iraq fully complies with all the conditions outlined by the UN.

Passing Out Parade

A flypast of Seahawk helicopters and a flypast of merchant ships marked the graduation of 160 officers in courses from HMAS CRESWELL, the Royal Australian Naval College at Jervis Bay on 16 August.

The Chief of Naval Staff, Vice Admiral Ian MacDougall, reviewed the parade which included officers who passed the Supplementary List and Special Duties Officers' Courses and Junior Naval Command Course. In addition he presented prizes to students who had excelled.

Eight retired RAN officers from the Year 1941 - 50 years after graduating from the RAN College themselves - were invited to CRESWELL for the passing-out ceremony.

Royal Australian Navy to abolish female rank titles

The Royal Australian Navy abolished all remaining female rank titles at the end of August.

From September 1 the acronym WRAN disappeared from the Royal Australian Navy lexicon; the same ranks will apply to all irrespective of sex.

The changes (in ascending order of rank) are:

- WRAN Recruit to Recruit;
- WRAN Seaman to Seaman;
- WRAN Leading Seaman to Leading Seaman;
- WRAN Petty Officer to Petty Officer;
- WRAN Chief Petty Officer to Chief Petty Officer;
- WRAN Warrant Officer to Warrant Officer.

VADM MacDougall reviewed the parade which marked the graduation of 160 officers in courses from HMAS CRESWELL, the Royal Australian Naval College at Jervis Bay on 16 August.

Three sisters, seen together for the last time off the WA coast. From left, HMAS SWAN, HMAS DERWENT and HMAS STUART. The latter spent her last day at sea on 31 May (ABPH N. Breen)

Kuwait Government invites Australian sailors

Officers and crew of the Australian guided missile frigate HMAS DARWIN, normally based at the home of the Australian Submarine Squadron at HMAS PLATYPUS in Sydney, Captain Dickenberg was invited to cut a symbolic chain with a pair of bolt cutters to gain admission to his new west coast office.

For the inaugural visit Captain Dickenberg was accompanied by three staff members. The visit was also designed to coincide with the arrival home from a south east asian deployment of HMAS OXLEY.

It is intended to arrange more regular and formal visits by Captain Dickenberg and his Submarine Squadron staff officers. Currently this is planned to be on a 6-8 week cycle and each visit comprising 4-5 people will include the Squadron Commander.

Construction will commence on the new

Australian Submarine Commander moves west

The Commander of the Australian Submarine Squadron, Captain John Dickenberg opened a new era for the Royal Australian Navy in Western Australia when he commenced working from a temporary office in the Naval Headquarters located at HMAS STIRLING fleet support facility from Monday, 5 August.
PERSISTENCE, an amphibious landing ship, was removed from the ship which was alongside at the HMAS STIRLING fleet support facility on 21st August.

The 45 tonne turret has been re-located to a concrete base outside HMAS STIRLING in NRC Headquarters, HMAS WATSON. The decommissioned destroyer escort YARRA and her sister ship PARRAMATTA will disappear shortly, after

being sold for scrap by AUSSALES the Commonwealth sales agency. The new owners, Sitheons Steel of Karachi, are making arrangements to tow the ships to Pakistan.

YARRA and PARRAMATTA were two of six River class destroyer escorts built in Australia between 1957 and 1970. Built as sister ships, they were similar to the British Type 12 frigate although their design was modified to incorporate improvements in equipment and habitability.

Both served with distinction in the RAN, making three trips each to Vietnam on escort duties. PARRAMATTA has been laid up at Garden Island since being decommissioned last January.

South-East Asian Visits

The Navy's trials and safety ship HMAS PROTECTOR and patrol boat HMAS FREMANTLE were at Darling Harbour on Saturday, 21 September supporting a charity concert organised by Pepsi. PROTECTOR's sturdy helicopter pad was used as the stage for a celebrity rock concert, with proceeds going to various Sydney charities.

Old timers sold

Regular users of Sydney Harbour will have grown used to the sight of HMAS YARRA moored in Athol Bight at George Street for the defence personnel who served in the Gulf. Watched by sets of thousands of cheering supporters, the parade was a fitting tribute to the 1500 men and women who served in the Gulf.

Malaysian Navy corvette LEKIR and support ship MAHAWANGSA also came alongside.

The ships also exercised with RAN units alongside. The Royal New Zealand Navy's 50th anniversary fleet review in October. Several Australian ships are also taking part in the NZ celebrations.

Presentation of Peter Ballesty Memorial Trophy

The Peter Ballesty Memorial Trophy was recently presented to TS VENDETTA, Coffs Harbour.

The Trophy is a perpetual trophy donated by the New South Wales Division of the Navy League of Australia in memory of his former President, Commander Peter Ballesty RANR. It is awarded annually to the Naval Reserve Cadet Unit in New South Wales exhibiting the most proficiency in Seamanship.

The Trophy is a scale model of HMAS ARVERE, a River Class Patrol Boat, at one time commanded by Commander Ballesty and attached to the Sydney Port Division of the RANR, of which Commander Ballesty was the Commanding Officer. The model was constructed by Larsen and Michael P. Richards, RNZ who had at one time served with Commander Ballesty.

A colour photograph, suitably framed and inscribed, is presented to the winning Unit and the name of the Unit and the date of award is engraved on the base plate of the actual model which is housed permanently in NRC Headquarters, HMAS WATSON.

The decommissioned destroyer escort STUART's 4.5-inch gun turret was removed from the ship which was alongside at the HMAS STIRLING fleet support facility on 21st August.

The 45 tonne turret has been re-located on a concrete base outside HMAS STIRLING in NRC Headquarters, HMAS WATSON. The decommissioned destroyer escort YARRA and her sister ship PARRAMATTA will disappear shortly, after

being sold for scrap by AUSSALES the Commonwealth sales agency. The new owners, Sitheons Steel of Karachi, are making arrangements to tow the ships to Pakistan.

YARRA and PARRAMATTA were two of six River class destroyer escorts built in Australia between 1957 and 1970. Built as sister ships, they were similar to the British Type 12 frigate although their design was modified to incorporate improvements in equipment and habitability.

Both served with distinction in the RAN, making three trips each to Vietnam on escort duties. PARRAMATTA has been laid up at Garden Island since being decommissioned last January.

South-East Asian Visits

The Navy's trials and safety ship HMAS PROTECTOR and patrol boat HMAS FREMANTLE were at Darling Harbour on Saturday, 21 September supporting a charity concert organised by Pepsi. PROTECTOR's sturdy helicopter pad was used as the stage for a celebrity rock concert, with proceeds going to various Sydney charities.

Removal of the turret from Stuart. (LSPH Scott Conway, RAMC)
To help bridge the gap in the all-important anti-submarine sphere of naval operations during the Second World War four large coasters, operated by Australian shipping companies, a former Royal Navy minesweeper converted to a River excursion ferry, two ex-British Admiralty tugs and a former Northern Territory patrol vessel were requisitioned for service as auxiliary anti-submarine and patrol craft. In addition the Dutch minesweeper ABRAHAM CRUNSSEN was commissioned for similar duties in September 1942.

The first of the coasters to join naval ranks was AUSN's BINGERA, just four years old and designed for operating along the Queensland coast. The ship experienced a much varied commission from patrol, training, stores to service vessel. Fourth of the group to enter the RAN was the Western Australian KYBRA, constructed for the State Shipping Service. KYBRA had spent most of her career sailing in ports in the south of the state, carrying both passengers and cargo.

The second coaster commissioned was the Queensland WILCANNIA ex WYRALLAH was the largest of the four coasters. Owned by the North Coast Steam Navigation Co the vessel had operated for only six years when taken over for war service. After WILCANNIA, in size, was Coast Steamships 1928 YANDRA, built for service from Adelaide to the ports of the Great Australian Bight.

DOOMBA was originally taken over for conversion to an auxiliary minesweeper and in June 1942 commenced duties as an anti-submarine vessel. The tugs HEROS and ST GILES were commissioned as anti-submarine vessels on 12 January 1940 and 15 January 1940 respectively. Both had been constructed in 1919 as units of the Rescue/Saint class and sold to Australian owners in 1925 and 1922. After ending their A/S roles the vessels were employed as tugs in both Australian and New Guinea waters.

ABRAHAM CRUNSSEN was one of several Dutch warships which had escaped to Australia after the fall of their East Indies possessions. The ship, in good condition, was soon accepted as a valuable addition to the RANs anti-submarine forces and accordingly was commissioned for these duties as well as the minesweeping and escort roles.

ARMAMENT

The coasters provided excellent deck space for the mounting of various weapons from the 4 inch QF (Quick Firing) Mk IV LA (Low Angle) gun on a CPIII mounting to the anti-submarine depth charges, dropped overboard at the stern by throwers or chutes. The 4 inch gun was mounted in the bow of each ship with an ammunition establishment of 100 rounds. A single 2 pounder QF Mk IIP*C was fitted aft with 500 rounds against air and surface targets.
The Navy. October-December, 1991

IN SERVICE

Like the requisitioned mine warfare ships of the Second World War, the nine large auxiliary anti-submarine vessels allowed the Navy to provide a relatively capable force at short notice. Although the ships were constructed to mercantile standards they could be quickly converted and fitted with a suitable armament. The speeds of all units, was, at the best, just sufficient for their role, and after the commissioning of the new Bathurst class Australian Minesweepers, the auxiliary A/S vessels were replaced in the convoy escort and anti-submarine roles by the new construction Corvette. Operationally the vessels served far and wide, and ultimately in a variety of roles.

The presence of such ships allowed the more capable ocean going units to meet the enemy at first hand, leaving the auxiliaries to form the so-called 'home-front'.

DISTINGUISHING LETTERS -
Requisitioned A/S Vessels
BG - BINGERA
FY 55, 922 gross, 130.1/29/13.6. 2000ihp = 12 knots, one 12 pounder, two 303 inch Vickers MGs, two DCTs. 58 crew.

HEROS

1939-1946
FY 87, W 130, 382 gross, 135.4/29/13.6. 1200hp = 12 knots, one 12 pounder, two 303 inch Vickers MGs, two DCTs, 32 crew.

HEROS was commissioned on 12 January 1940 and remained active around the continent until returned to her owners on 13 August 1942.

Subsequently the tug was taken over for brief periods to tow battle practice targets. On 2 November 1939 she was requisitioned for naval duties and converted for use as an auxiliary anti-submarine vessel. HEROS commissioned on 12 January 1940 and remained active around the continent until returned to her owners on 13 August 1942.

KaKorea

Vessels — continued

BINGERA

1939-1946
FY 88, 922 gross. 200.2/34.1/9. 12 knots, 6798 miles at 11, one 4 inch, two 303 inch Vickers MGs, two DCTs. 58 crew.

The four year old BINGERA was built by William Denny and Brothers Ltd of Montrose, Scotland for the British Admiralty. In September 1940, the tug was taken over for use as an auxiliary anti-submarine vessel. HEROS commissioned on 12 January 1940 and remained active around the continent until returned to her owners on 13 August 1942.

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KYBRA was sold to Hong Kong interests and operated under various operators in South East Asia until broken up in April 1948.

KYBRA carried a total of 170 tons of fuel, including 100 in reserve. At 10 knots, the ship’s endurance was 23 days. Hold capacity was 34,270 cubic feet with a lift of 3 tons. Later reports show the ship fitted with a ‘Hedgehog’ anti-submarine weapon and three 20mm Oerlikons in lieu of the four 2 pounders fitted. Also mounted one PAC rocket projector.

ST GILES
1939-1947
FY 86, 430 gross, 135-426/13.6, 1200hp = 12 knots, one 12 pounder, two 303 inch Vickers MGs, DCTs.

Launched on 14 May 1919 by Ferguson Bros, Port Glasgow and completed 13 August as a unit of the Rescue/Saint class for the British Admiralty. Sold in July 1922 to J. and A. Brown and arrived in Newcastle 7 November 1922. Resold in May 1931 to Waratah Tugs, her forecastle removed and tonnage dropped from 463 to 380 gross.

ST GILES was requisitioned for naval service on 2 November 1939 and commissioned for the anti-submarine role on 15 January 1940. Conversion work was undertaken at the Garden Island Dockyard when her forecastle was increased to 430 gross. The tug operated in south-eastern waters until taken over by the Commonwealth Salvage Board on 18 May 1942. Following operations under the Red Ensign she was requisitioned again in August 1945, commisioning on 23rd of the month. The tug was active in northern Australian and New Guinea waters.

KYBRA carried a total of 170 tons of coal, one 12 pounder, two .303 inch Lewis MGs, two DCTs, 61 crew.

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KYBRA was sold on 14 October 1946 for $5,600.

WILCANNIA
1940-1949
FY 91, 990 gross 218/35.2/12.9, 12 knots, 62 days at 12.6, one 4 inch, one 2 pdr, one 303 inch Vickers MGs, two DCTs, 66 crew.

Another of the North Coast Steam Navigation ships to see naval service, the 1934 vintage WYRALLAH was requisitioned in January 1940. After commissioning on 26 September 1940 the ship experienced escort and anti-submarine patrols around the coast line. In February 1942 her name was changed to WILCANNIA, to avoid confusion with the ANS WYALLA.

WILCANNIA was requisitioned for naval service on 27 June 1940 and proceeded to Sydney to be converted to her new role.

After commissioning on 22 September the ship was based at Fremantle from 24 October to 21 April 1941 and later from 15 June 1944 to 27 December 1941. During the years 1942 to 1945 WILCANNIA was operated in eastern waters and as far north as New Guinea. The ship’s moment of glory came in
Throughout most of the 1960s and 1970s the Royal Australian Navy's trials requirements were largely met by HMAS DIAMANTINA, an ex Second World War frigate and HMAS KIMBA, a boom defence vessel which was built in the 1950s. With the disposal of these vessels in the 1970s the only ship which was available for support of long term Navy and the Defence Science and Technology Organisation's (DSTO) trials requirements was HMAS COOK.

The main advantage of using a dedicated trials vessel was seen to be one of guaranteed ship availability as warships could seldom be allocated for periods long enough to allow for the careful and timely conduct of scientific research work. In addition, a dedicated vessel which is small, relatively cheap and provides flexibility of usage offers an efficient solution to Navy and DSTO requirements.

A brief study was undertaken to determine the preferred method of procuring a trials and safety ship. Four options were addressed:
- charter a vessel;
- design and build a special purpose vessel;
- modify an existing design and then build;
- purchase an existing ship which most nearly meets the requirements and modify as necessary.

The purchase and modification of an existing ship was assessed to be the least cost option and would also enable the early entry of the vessel into naval service. Ships assessed as potentially suitable for the trials and safety task included Offshore Supply Vessels, Fishing Trawlers, Petrel seiners and small Roll-off vessels.

Navy first became involved with BLUE NABBIA when the National Safety Council of Australia (NSCA) Victorian Division offered submarine rescue services on a charter basis using its PC-1804 submersible.

Navy's endorsement of revised ship characteristics which had been sought. This examination culminated in HMAS PROTECTOR's trials requirements in conjunction with DSTO.

In August 1987 the New Submarine Project advised their requirements for an escort and safety vessel to support the sea trials of the new Collins class submarines, which the Commonwealth was contractually obliged to provide. The characteristics sought were similar to those of the trials ship Project 1167 which subsequently fulfilled the 'Trials and Safety Ship', to incorporate the escort and safety roles.

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Navy first became involved with BLUE NABBIA when the National Safety Council of Australia (NSCA) Victorian Division offered submarine rescue services on a charter basis using its PC-1804 submersible.
HMAS PROTECTOR was purchased on 18 October 1990 and arrived in Sydney, on her delivery voyage, the following month. She commissioned on 30 October 1990 and was renamed HMCS PROTECTOR on 20 March 1991, at the Fleet Base, Williamstown, under the command of Lieutenant Commander Graeme Banyer.

Several names were considered for the ship. They included "P. R. T. 2", "KILMBA, STOKER and HUDSPETH". The choice was narrowed to the first two names. Preference for PROTECTOR prevailed, as it—

- has a direct association with submarines, as her predecessor acted as a tender to the RAN submarines AE1 and AE2 during the First World War; and
- PROTECTOR II was built at Elder Prince Marine Service, now Stirling Marine Services, of Port Lincoln, South Australia. The ship was commissioned as the M.V. OSPERI, but was purchased by the Commonwealth and renamed BLUE NABBILA. As originally constructed she had a displacement of 670 tonnes. The functions of HMCS PROTECTOR are:

- to act as submarine escort and safety vessel during the Collins class trials, as a tender, and support and target vessel for submarine trials;
- to be able to conduct all facets of RAN mine warfare activities in support of trials and safety activities;
- to support submarine trials activities including the survey, laying and recovery of practice minefields; and
- to conduct environmental data gathering in support of the Mine Warfare Plan and submarine trials. Performance of these functions requires a ship which has good navigational precision, good manoeuvrability, combat and support capabilities. Specifically the ship should have:

- the ability to precisely locate and hold itself over a given datum;
- sufficient deck space for the stowage of trials, support, MCM diving and rescue equipment;
- lifting equipment for deployment and recovery of scientific, mine, trials, rescue and firefighting equipment; and
- facilities to enable communications with other ADF and civil authorities; and
- vertical replenishment facilities.

NAVIGATION/Manoeuvrability Characteristics

HMCS PROTECTOR is fitted with a broad array of commercial navigation, equipment, including gyro and magnetic compasses, an associated array of navigational equipment, a ship's integrated navigation and satellite navigation systems; GPS log; echo sounders; and two navigational radar systems. A Sylways navigation system has also recently been installed for mine warfare-related activities. The ship's manoeuvrability system has two controllable pitch propellers; two rudders, which can be operated independently, and four thrusters, two in the bow and two in the stern. In addition, there are two outboard thrusters alongside the ship's propellers, which are unique in the Royal Australian Navy - no other ship possesses such high manoeuvrability.

EQUIPMENT STOWAGE CAPACITY

HMCS PROTECTOR has considerable area of her superstructure for storage of trial and support equipment. She is capable of stowing about three standard ISO 20 foot containers plus two half containers on deck. This can accommodate a portable six man recompression chamber. The installation of a handling system for the recompression chamber, which incorporates a trolley system on tracks, has reduced the ship's storage capacity on the after deck.

LIFTING EQUIPMENT

HMCS PROTECTOR is fitted with an A-frame crane, 13.8 tonnes capacity. She is also fitted with a 35 tonne crane in the hangar with a 18 tonne capacity. She is also fitted with a 35 tonne crane in the hangar with a 18 tonne capacity.

FIRE MONITORS

PROTECTOR is also fitted with two fire monitors on top of the funnel. Both can be employed for fire fighting on other ships or a helicopter in the flight deck. The system employs fresh water and water.

RADAR SYSTEMS

PROTECTOR has a choice for service along the Chinese coast as part of the Australian Federal, and civil task.

Aviation Facilities

HMCS PROTECTOR is fitted with a helicopter facility. The fit of a new second helicopter facility and support vessel. PROTECTOR will be subsequently employed in support of new submarine trials of South Australia and Western Australia from early 1994 to about 2004. Overall, HMCS PROTECTOR is an important asset to the Royal Australian Navy's flexibility and broad range of ship systems, making it suitable for a number of tasks, including support in naval operations, and Australian Defence Force, and civil task.

The First Protector

Prior to Federation the Colonies were responsible for their own defence and in 1884 the South Australian Navy took delivery of the 920 ton HMCS PROTECTOR. The ship was built at Newcastle-upon-Tyne in the United Kingdom by Sir W.G. Armstrong and Company and took 3 months to make the voyage to Port Adelaide.

HMCS PROTECTOR at that time carried 18 inch and 5 inch guns which ranked among the most powerful gunboat types in the Royal Navy. She had two 30 inch bore 12,800 lbs (eg Kiowa, Iroquois and Skipper) vertical replenishment and medical evacuation vessels.

During the years up to the creation of the Australian fleet PROTECTOR was continuously employed off the South Coast and Southern states where she was available for sea training in the southern states. In addition to South Australia the Australian fleet was steamed for several years and thus has a link to several voyages to Victoria and Tasmania before being re-boilered in 1910.

In 1911 PROTECTOR was integrated into the Royal Australian Navy for several years and thus has a link to several voyages to Victoria and Tasmania before being re-boilered in 1910.

In 1920 the PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment. In 1922 PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment. In 1922 PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment. In 1922 PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment. In 1922 PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment. In 1922 PROTECTOR was transferred to the new Naval Depot at Pay Bay in preparation for the official opening of that establishment.

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MORE MONEY MUST BE SPENT ON DEFENCE

by A.W. GRAZEBROOK

Once again, the annual Commonwealth Government Budget has been handed down. Once again it includes a round of cuts in training, operations and existing forces and delays in essential programmes for the Australian Defence Force.

This year the cuts and delays are accompanied by a planning directive that Defence Budgets for the next three years are to be based on nil real growth in the Defence Budget.

There is a popular political falsehood about defence expenditure. That is that a nation can have only the defence it can afford. That approach is dangerously wrong.

A nation must spend on defence the money necessary to defend the nation.

The money must be well spent. It must be spent cost effectively. The nation must get maximum value for its defence expenditure. Enough money must be found to defend Australia and her interests.

Personnel retention problems persist. They will get far worse if the economy recovers and industry intensifies competition for high tech personnel.

In summary, because the cost of defence equipment is increasing at a higher rate than inflation, nil real growth in defence expenditure means a decrease in the relative strength of the ADF at a time when most regional defence forces are getting larger and stronger.

Australia cannot go on year after year reducing its Defence Force when our neighbours are increasing their armed forces.

It is easy politically to find more money for defence at a time of recession. It requires leadership and political courage to propound the case. Preparedness to do so is the mark of the statesman, as distinct from the politician.

FOUDRE – New French Landing Ship

CONSTRUCTION

The ship's hull consists of 90 approximately cubic welded sections, (an elementary cube weighs 80 tonnes approximately) and measures between 6 and 10 metres on the side; the first block was laid in March 1986, and the ship in October 1987, i.e. eighteen months later.

The laying out phase was the longest, because of the complexity of the installations and the number of rooms (750 approximately); this phase started as early as the construction of the first cube, using the "prefitting out" technique, and lasted until official trials started in January 1989. This LPD is therefore the 475th ship launched at the Bremer arsenal since its creation by Colbert in 1661. The large shipyard created for laying down and finishing the ship was used as a major test bench to improve state-of-the-art construction techniques (computer-aided design, modular construction) to be used for construction of the Charles de Gaulle nuclear-powered aircraft carrier in the Lantinon dock left vacant by the FOUDRE.

MISSIONS

The FOUDRE amphibious transport dock primary mission consists in taking part in amphibious operations of the Force d'Action Rapide (rapid intervention force) for the transportation and landing, on a non-prepared beach, in a hazardous zone, of the armed units of the Force. In addition, the FOUDRE LPD takes part in the navy's logistic support: performing material transport missions and maintenance of small ships.

DATA

- LOA: 168 m
- Beam at the waterline: 22 m
- Molded draft: 5 m
- Mean trial's displacement with freight: 11,300 t
- Well deck: 14 x 122 m
- Ballast volume: 7,000 m³
- Maximum speed: 21 knots
- Range: 11,000 nm at 14 knots
- Maximum power: 2 x 10,400 HP
- Electrical power: 5 x 850 kw diesel generators
- Freight capacity: 1,880 t
- Handling facilities: 1 x 52-tonne lifting platform
- 1 x 137-tonne crane at 12 m
- Complement: 226
- Passengers: 467

The well deck is a 1,640 m² surface area floating dock. When carrying an intervention force, the dock can contain:
- 10 LCMs
- 4 LCMs + 1 LCV
- 275 km² of freight
- 1 x 850 kw diesel generators
- 21 knots
- 14 x 122 m
- Passengers: 467
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- Ballast volume: 7,000 m³
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FOUDRE LANDING SHIP
continued

VEHICLE STORAGE CAPACITY
The vehicle storage capacity is such that 3 LPDs may operate jointly and transport a mechanical regiment composed of:
- 22 AMX 30 tanks
- 44 AMX 10 RC tanks
- 22 FAV
- 41 X-country 1 W vehicles, including
- 16 MILAN anti-tank missile systems
- 54 trucks TRM 4000
- 15 light trucks TRM 2000
- 5 rack trucks
- 2 heavy recovery trucks,
- 6 120-mm mortars,
- 67 miscellaneous trailers,
- 1 beaching grating layer i.e. a load of 330 tonnes approximately.

MOBILE DECKS
The mobile decks can be used as mobile landing areas, hangars and storage decks, served by a hydraulically-activated gate.

VEHICLE MOVEMENT
The ship has been designed for easy vehicle movements.
A 52-tonne lifting platform serves the dock, the vehicle hangar, the mobile decks, the parking area on the vehicle hangar roof and the side ramp door.

AVIATION
The aeromotor installations are designed to allow day and night operation of helicopters, the mission of which is to airlift commandos. These installations include:
- a main landing area equipped with two spots for SUPER-PUMA. One of the spots is equipped with a landing grid, a secondary landing area made up of the mobile decks, a landing aid lighting equipment, one dual "SAM-L" equipment for transferring helicopters from the hangar to the forward spot, a fixed hangar for storing 4 SUPER-PUMA type (9 tonnes) or 2 SUPER-FRELON type (13 tonnes) helicopters.
- sterooms and helicopter maintenance workshops.

MOBILE DECKS
The mobile decks can be used as a secondary, landing area, or as parking areas for vehicles. The panels are installed on their roller tracks by means of the crane. They are removed to dock high air draft ships.

AMPHIBIOUS OPERATIONS
The arrangements of the FOUDRE LPD allow preparation and control of amphibious operations.
The following rooms are provided:
- the planning room, used during transit to the theatre of operations for detailed planning of the landing;
- the Joint Control Center where the amphibious operation commander-in-chief and his staff coordinate and control the activities of all the forces involved in the landing;
- the CIC where the amphibious naval force chief of staff prepares his instructions to the other landing craft and chartered civilian ships;
- the "Helicopter - vehicle movements" control center which coordinates and monitors the movements of the helicopters and landing craft.
- the communications room which provides communications with the naval forces, amphibious forces, the commander of the naval theater, and the Army Staff in France.

FOUDRE LANDING SHIP continued

PROPULSION
Propulsion is by two propeller shafts equipped with variable pitch reversible propeller each driven by a 7 600 kw SEMT-PIELSTICK 16 PC 2.2 2 V 400 diesel engine.

ELECTRICAL
Electrical power is produced by five 850 kW SACM-UNI-DIESEL diesel generators, distributed in three stations, two main stations located near the propulsion rooms and one station located forward, near the bow thrusters.

ARMAMENT
During the amphibious operation, the LPD protection is maintained by the other ships and aircraft in the force. However, the ship has anti-aircraft self-defence weapon systems:
- a SIMBAD missile self-defence weapon system,
- a 40-mm gun,
- two 20-mm guns,
- two 12.7-mm heavy machine guns.

MEDICAL
The FOUDRE is fitted with a large sick bay, which allows execution of large-scale medecine operations, medical and surgical support to combat troops, assistance to civil populations, etc. This sick bay, with a surface area of 500 m² and a 47 bed capacity has many interesting features. Its location beneath the flight deck, close to the elevator platform makes it easily accessible.

The medical-surgical teams on use two operations rooms, one for orthopedic surgery, the thigh and the other for surgical acts.

This arrangement is supplemented by a dressing room used for less intensive care. The sick bay also includes two resuscitation rooms, one of which is specially fitted out for the treatment of severe burns.

- one X-ray examination room,
- one biology lab with blood bank,
- one dental surgery room,
- one sterilization room, with an autoclave.

A computer-based management system has been set up for improved efficiency: it handles pharmaceticals and medicines which have to be checked at regular intervals.

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A computer-based management system has been set up for improved efficiency: it handles pharmaceticals and medicines which have to be checked at regular intervals.

Such materials and human resources make the FOUDRE an outstanding hospital ship capable of fast and far-reaching interventions.

CONCLUSION
The hull is constructed around an inner deck which extends over 3/4 of the ship's length.

The ship is designed for the landing of battle tanks and other vehicles, by means of landing craft. According to the ship's architecture, it is designed for the landing of battle tanks and other vehicles, by means of landing craft. Accordingly, the ship's architecture is designed for the landing of battle tanks and other vehicles, by means of landing craft.

During transit to the theatre of operations, the landing craft are transported high and dry in the dock. Deployment of the landing craft is carried out after immersion of the ship by ballasting, flooding of the dock and opening of the LPD's aft gate.

The LPD's main particulars are:
- vast battleship tank and vehicle storage areas, hangars and storage decks, served by a 52-tonne lifting platform and a side ramp,
- aeromotor facilities,
- landing deck allowing simultaneous operation of several helicopters,
- hangars accommodating four 9-tonne helicopters.
Submarines of the Russian and Soviet Navies 1918-1990

By NORMAN POLMAR and JURRIN NOOT

Published by Conway Maritime Press

World War Two marked a turning point in naval historical development. Since then, technologies, the emergence of the 'high-tech' world, and incredibly rapid technological change have combined with newly evolved or refined strategies to produce a wholly new naval situation.

The hybrid warship is one that combines characteristics found in more than one type of warship. It is designed to perform the function of an aircraft carrier, with an incredible insight into the hybrid warfare. It is accessed by a ship with the forward section of a battleship/aircraft carrier. The aircrafts are carried forward of the bridge. The deck is capable of carrying 12 fighters and two torpedo bombers for reconnaissance aircraft.

The British Surface Fleet Options for Medium-Sized navies

By D.K. Brown

Published by Conway Maritime Press

The first 200-page book offers a vision of the Royal Navy in the past 100 years. The author has spent most of his career in the design of warships, notably as the Deputy Chief Naval Architect at the Admiralty. The book does not contain any official forecast or policy statement, but it provides an insight into the evolution of British naval architecture.

The Future British Surface Fleet Options for Medium-Sized navies

The Changing Face of the Submarines of the Russian and Soviet Navies - 1945 to the Present

By BRUCE W. WATSON

Published by Arms and Armour Press

This book traces developments in, and their evolution, with reference to the overall nature of the Soviet Union and the world situation, and have important implications for all future medium-sized navies.

Hybrid Warship: The Amalgamation of Big Guns and Aircraft

By R.D. LAYMAN and STEPHEN McLAUGHLIN

Published by Conway Maritime Press

A 'hybrid' warship is one that combines characteristics found in more than one type of warship. It is designed to perform the function of an aircraft carrier, with an incredible insight into the hybrid warfare. It is accessed by a ship with the forward section of a battleship/aircraft carrier. The aircrafts are carried forward of the bridge. The deck is capable of carrying 12 fighters and two torpedo bombers for reconnaissance aircraft.

Allied Coastal Forces of World War II Volumes I, II

Fairmile designs & US submarine chasers

By JOHN LAMBERT and AL ROSS

Published by Conway Maritime Press

The US Navy SC 497 class 110 ft submarine chasers. This 26-page book gives details of all the boats and their armament, and explains the organisation of their production and their service and achievements.

Divided into five sections of more than 30 chapters this work is superbly illustrated with some 65 colour photographs and hundreds of highly detailed line drawings.

The Changing Face of the Submarines of the Russian and Soviet Navies 1945 to the Present

Published by Arms and Armour Press

The book traces developments in, and their evolution, with reference to the overall nature of the Soviet Union and the world situation, and have important implications for all future medium-sized navies.

The Hybrid Warship: The Amalgamation of Big Guns and Aircraft

By R.D. LAYMAN and STEPHEN McLAUGHLIN

Published by Conway Maritime Press

A 'hybrid' warship is one that combines characteristics found in more than one type of warship. It is designed to perform the function of an aircraft carrier, with an incredible insight into the hybrid warfare. It is accessed by a ship with the forward section of a battleship/aircraft carrier. The aircrafts are carried forward of the bridge. The deck is capable of carrying 12 fighters and two torpedo bombers for reconnaissance aircraft.

The Changing Face of the Submarines of the Russian and Soviet Navies 1945 to the Present

Published by Arms and Armour Press

The book traces developments in, and their evolution, with reference to the overall nature of the Soviet Union and the world situation, and have important implications for all future medium-sized navies.
French frigate BALNY departs harbour after a five day visit (S. Morrison)
MV NAFANUA was handed over to the Western Samoa Government in Apia on 19 March 1988. After a period of training, the ship sailed for Western Samoa arriving in Apia on 26 May 1988. 

NAFANUA is operated by the Maritime Wing of the Western Samoa Police Service. The Maritime Wing currently has 15 personnel attached to it, all of whom form the crew of the Patrol Boat. There are plans in place to increase the size of the Wing to 20 which will allow a small support element to work in the wharf area.

NAFANUA is used as a civilian registered vessel. This required the ship to be maintained in survey to the requirements of the Samoan Ministry of Transport. The task of maintaining the vessel in survey is made easier because of the commercially available equipment that has been used in the ship. There are three Advisers attached to Western Samoa, LCDR Chris Churcher who is the Maritime Surveillance Adviser is responsible for advising on the operation of the Patrol Boat and the operation of the National Surveillance Centre. CPOETC4 Jerry Thurbon is the Electrical Adviser and CPOPEA Peter Ward (RNZN) is the Marine Engineering Adviser.

NAFANUA has primarily been employed on surveillance tasks within the 200 nautical mile Exclusive Economic Zone (EEZ). This relatively small area of approximately 40,000 square miles allows the ship to conduct a lot of short patrols rather than fewer lengthy patrols. During her two year career NAFANUA has apprehended three vessels for alleged fishing within the EEZ. This has included a visit to HMAS Watson, where shortly afterwards the Executive Director of the local US Navy League and three US Navy personnel complete with buses arrived and took us quite some distance from downtown Honolulu to the Barbers Point Naval Air Station where we were to be accommodated during our stay.

Unfortunately the ship grounded in Apia Harbour about one month later needing the ship to return toPago Pago for more repairs. By mid-May 1990 the ship was back in service. Since that time the ship has been employed on fisheries surveillance tasks, Search and Rescue operations and a number of short duration charter operations. These include the laying of a wave/swell measuring buoy for the United Nations Development Program and during December 1990 the ship underwent her first visit outside of the Samoas when the Western Samoa Police Band was transported to Tonga for the Tongan King's Silver Jubilee.

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The ship has functioned well since being in Western Samoa although the Cyclone affected all aspects of the Samoan economy putting limitations on the Patrol Boat over the last financial year. The effects of the Cyclone are still being felt in the economy and may remain for some years.

**THE NAVY**

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**Navy League/NRC News**

**HAWAII 1990**

Forty-three NRC personnel including officers, instructors and cadets (male and female) departed Brisbane on 18th September arriving back home on the 30th. The following account of our overseas training venture has been written by one of our female cadets 16 years old LS Lesley McCauley.

After a few hours stopover in Sydney, which included a visit to HMAS Watson, we arrived in Honolulu at 0530, where shortly afterwards the Executive Director of the local US Navy League and three US Navy personnel complete with buses arrived and took us quite some distance from downtown Honolulu to the Barbers Point Naval Air Station where we were to be accommodated during our stay. This major naval air station supports 29 tenant commands and aircraft vary from P-3s to helicopters. The base is home to some 14,700 military personnel, their dependents and civilian employees. During our stay we inspected several operational squadrons, "climbing through" their planes, Control Tower and Operations plus some of their maintenance facilities.

On the base we had the comforts and services of a local community such as medical/dental facility, a major department store (The Navy Exchange), a Commissary, a McDonald's and a Pizza Hut, and numerous recreational facilities such as Gym/fitness Centre, two on-base swimming pools, beach and beach cottages.

Our first outing was a day trip to the Arizona Memorial and Visitor Centre and Bowfin Park. The Arizona Memorial complex comprises the structure spanning the sunken battleship USS Arizona and the Visitor Centre which includes a museum and picture theatre which shows a film of the Japanese bombing of Pearl Harbour in 1941. We then visited the Bowfin Memorial Park, also within the Pearl Harbour Naval Base. This area is maintained as a memorial to the 52 US submarines and 3,505 submariners who were "lost" during World War II. We saw submarine equipment, photographs and memorabilia and walked through an historic World War II submarine.

Our unit continued its training with tours around the Cruiser/Destroyer base at Pearl Harbour, ship visits to USS Coronado (AGF 44 the 7th Fleet Flagship), a ship of the Japanese Training Squadron (visitors at the same time), witnessed US sailors undergoing firefighting training, etc., visited their stores and maintenance areas and lunched with them in their messes.

During our stay we also made visits, courtesy of the US Navy bases, to the
Submarines Base (restricted photography area), Marine Corps Base, Coast Guard Air Station and the Coast Guard Sea Unit at Sand Island where we were all taken for an hour at sea in one of their patrol boats. Overall, we saw a lot of the US military's Hawaiian facilities including several service museums and monuments.

Even during free time our hosts kept us on the move around the island, visiting Waikiki Beach, Sunset Beach on the north side of the island, the Hard Rock Cafe and best of all, we went shopping.

We visited the Barbers Point US Naval Cadet Unit during their evening training parade and they hosted us to a most excellent and entertaining all day Saturday barbeque at the base's beach. Overall our trip to Hawaii was very enjoyable, great fun and most of all it was a terrific training experience.

On behalf of the cadets of TS Gayundah, I would like to thank:

1. The CO and staff of Barbers Point Naval Air Station for having us and providing the accommodations and transport
2. The Directors of the Pearl Harbour Group of US Navy League for arranging the visit
3. Our parents and the Unit's Parents Committee for financing the trip
4. Our officers and instructors for organizing such a fantastic ACT

J. STANTON
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