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Periscope on Australia

by Grommet

DEFENCE AID TO MALAYSIA AND SINGAPORE

On 13 December, 1970, it was announced that a further programme of Australian defence aid to Malaysia and Singapore valued at $20 million over a three year period, had been approved.

Prior to this announcement, the total sum allocated so far under continuing programmes since 1964 was $45 million.

Major projects still in progress include the provision of technical assistance in the development of Singapore's **Bloodhound** missile capability and the extension of training assistance to Malaysia in respect of the Sabre fighter aircraft which had earlier been given to the Royal Malaysian Air Force as an addition to the $20 million programme of 1969-1970.

Projects will be selected in close consultation with the two countries concerned and will take into account the considerable progress made by both over the last few years in the development of their defence capabilities.

CHAIRMAN, CHIEFS OF STAFF COMMITTEE

The office of Chairman, Chiefs of Staff Committee within the Department of Defence, has been raised to four-star rank and Vice Admiral Sir Victor Smith, K.B.E., C.B., D.S.C., was promoted to Admiral, with effect from 23 November, 1970.

The Chairman is the principal military adviser to the Minister for Defence, and with the increasingly complex range of matters engaging the Government's attention, the responsibilities of the Office have expanded considerably.

PATROL BOATS COMPLETE RIVER TRIP

The Navy patrol boats **Aitape** and **Ladava** cleared the Fly river, Papua-New Guinea, on 16 December, 1970, having sailed a total distance of 944 nautical miles up and back down the river at an average speed of 10 knots.

The 700 mile long river ranges in depth from a minimum of 35 ft. and maximum of 120 ft. The river runs mostly through swamp, and crocodiles and other wild life were reported to be numerous.

NAVY NURSES IN THE SWIM

As part of their training, Royal Australian Navy nurses are receiving underwater diving instruction at H.M.A.S. PENGUIN. Emerging from the water is Sister T. Reid, following an underwater training session.

APPRENTICES READY FOR SEA DUTY

The Governor-General's prize for the best "all-round" apprentice was awarded to 19 year old, Senior Apprentice B. R. Larson.

The award was made at a Passing Out Parade for more than 80 R.A.N. apprentices, held at the Royal Australian Navy Apprentice Training Establishment, H.M.A.S. **Nirimba**, on 16 December, 1970.

Passing Out Parade at the Apprentice Training Establishment, H.M.A.S. NIRIMBA. Rear Admiral G. J. B. Crabb pauses to talk with Junior Apprentice David Wilding. The young apprentice is a member of the base's volunteer band.

The award was presented by the Flag Officer Commanding East Australia Area, Rear Admiral G. J. B. Crabb, C.B.E., D.S.C.

The official ceremony was followed at night by a ball arranged by the successful apprentices.

LEGAL CONFERENCE

In an effort to keep its disciplinary codes in line with the modern world, the R.A.N. held a three-day international legal conference at H.M.A.S. **Penguin**, from 20-22 January.

Papers presented included "Service Discipline in a Permissive Society", "Principles of Punishment" and "Dual Jurisdiction," i.e. the problems which arise when civil and service authorities both have jurisdiction over a Service offender.

Other papers included "Drunkenness as a Defence", "Fisheries Protection", "R.A.N. Administrative Law" and the proposed uniform disciplinary code for all Australian Services.

Officers from Australia, New Zealand, Britain and the United States attended.

R.A.N. COLLEGE-PROMOTION PARADE

A total of 23 Midshipmen became acting Sub-Lieutenants at a ceremonial promotion parade held on Friday, 4 December, 1970, at the Royal Australian Naval College, H.M.A.S. Creswell, Jervis Bay, N.S.W.

The young officers paraded before the Governor-General, Sir Paul Hasluck and guests included the Chief of Naval Staff, Vice Admiral R. I. Peek.

The Governor-General presents the Queen's Medal to the outstanding midshipman of the year, 20 year old, Sub-Lieutenant Garry Sproule.

The Queen's Medal goes to the midshipman with high qualities of character and bearing and who has been a good influence on the other members of the course.

NEW ADMIRAL

Commodore B. W. Mussared has been promoted Rear Admiral and has been appointed Project Director of the Light Destroyer (DDL) Project, as from 1 March, 1971.

The preliminary design study for a new class of destroyer for the R.A.N. is already in progress.

NEW BASE

Two Attack class patrol boats sailed from Sydney on 25 January, to establish a new base at Cairns, North Queensland.

A lingering look at Sydney for the crews of the patrol boats, H.M.A. Ships Barbette and Bayonet.

A third patrol boat joined the Cairns base during mid-February.

The three craft are on permanent deployment and will carry out patrols in northern waters, including the fishing waters of the Great Barrier Reef.

Housing for the crews and their families has been included in the needs of the new establishment which is officially recorded as a "contract maintenance facility".

CANADIAN DEFENCE COLLEGE VISIT

A 35 man party from the Canadian National Defence College visited Australia during February, as part of a study tour of Asia and the Pacific.

The group, led by the Commandant of the College, Rear Admiral S. M. Davis, comprised students, members of the faculty and staff.

The Canadian National Defence College, located at Fort Frontenac, visits a number of countries each year to look at social, political and economic aspects and to learn something of the countries' foreign and defence policies.

EXCHANGE DUTY

The R.A.N. has begun a front-line duty exchange with United States Navy Grumman Tracker pilots.

Having finished a tour of duty with 816 Squadron, aboard H.M.A.S. Melbourne, Lieutenant R. K. Smith, R.A.N. left Australia recently for California to undergo training before being posted to a U.S. carrier.

His exchange pilot, Lieutenant P. B. King, is likely to be posted to 816 Squadron in Melbourne, after a period of duty at the Naval Air Station, Nowra.

HOME WITH HONOUR — TO A BIG FUTURE

The return of the ss Great Britain to the English shipyard where she was launched 127 years ago marks the beginning of a new chapter in the saga of the world's first iron-clad propeller-driven passenger ship. After extensive restoration work she will be preserved, in one form or another, as a national monument to British maritime engineering prowess in the 19th century.

By
John O'Callaghan

As the ss (steam ship) Great Britain slid quietly up the River Avon to Bristol in south-west England, there was no hint of the drama that had made this last tranquil journey home possible.

Launched in 1843, this 322 feet ship was the world's first iron-clad propeller-driven liner. These and other revolutionary aspects of her design helped to give Britain a massive lead in building steam ships.

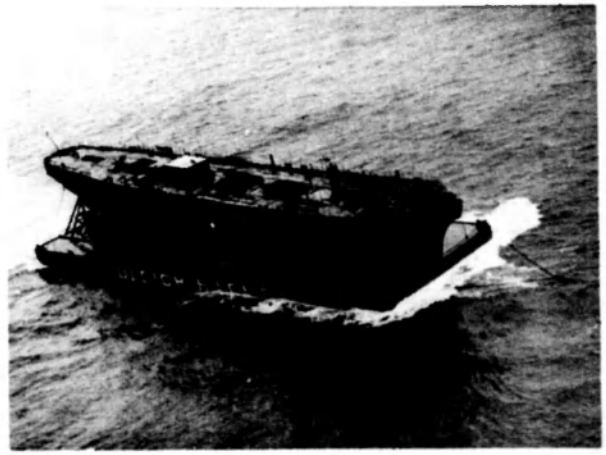
After a varied career, with 47 voyages, the **Great Britain** has spent the last 30-odd years aground and abandoned in a cove in the Falkland Islands.

Now, on her return to Bristol — where she was built — thousands watching from the River Avon's banks, and millions watching on television saw only a docile hulk being towed home after 127 years away. Back with her came the salvage crews of Risdon-Beazley Ulrich-Harms, the Anglo-German consortium that performed the rescue operation and provided the lift across the Atlantic on a huge floating pontoon.

Bad Weather

Mr. Leslie O'Neill was in command of the salvage work. He recalled: "If you were fanciful and romantic you would have said in the Falklands, as you watched the ship just move into wind and come up between the vertical 'dolphins', and back again, that it was just as if she wanted to get on the pontoon. But, as soon as we got her on, it seemed that the elements were against us the whole time.

"When we went to move her in to Port Stanley it blew like blazes. The morning we left for the voyage to England it was nice — but the wind came up and by the time we left the Falklands there was quite a swell, and the ship went right out into bad weather. It was blowing at up to 80 or 90 knots, and so I thought to myself when darkness came the first night, 'if she is there in the morning she will last to England'."



The GREAT BRITAIN, the world's first iron-clad propeller-driven ship, photographed from the air as she was being towed on her wooden pontoon up the Bristol Channel, England, near the end of her long voyage home from the Falkland Islands.

The **Great Britain** lasted very well and arrived at Avonmouth on 23 June with only one more setback to face. That was on 2 July, when she had been patched up and was ready to float on her own.

Just as she floated free of the pontoon in the dock at Avonmouth, the forward part of the great platform shot back to the surface, severely jarring the **Great Britain** and shredding one of the steel cables holding her to the dockside.

Because of the great split down her starboard side, it was vital to avoid any twisting motion — and this was just what the pontoon created. There were some frantic moments, but the bracing at the crack held and the recovery organisers were soon saying, "the ship has survived this — there will be no difficulty for her floating on her own bottom up the Avon." Nor was there. The pontoon-punch was fate's last throw.

Two-Year Restoration Programme

The present storms that blow around the **Great Britain** are academic. As she lies at the start of a two-year programme to restore her to her 1843 splendour in the very dock where she was made, Brunel's (the designer of the **Great Britain** was the famous 19th-century engineer, Isambard Kingdom Brunel.) old ship is safe from physical harm. The huffing and puffing is now about who shall provide the ship with a home.

Tourist Hotel Suggestion

London lacks any close connections with the ship, which was in the River Thames only twice. But London has money, and it has the argument that if the **Great Britain** is to be on view as an

example of Britain's technical skills as a maritime nation, then, as a national monument, the vessel should be in the nation's capital. Money will be needed, because the restoration will cost 2 million pounds.

There are two other suggestions for the ship's future in London — the first that she could become a tourist hotel, as was proposed for the Cunard liners sold to America.

This idea has a lot to recommend it. Americans would, it is supposed, flock to stay on the ship restored (with air-conditioning as a modern extra) to her Victorian glory. Even if she offered only the original 115 two-bed cabins, and 26 single-bed state rooms, it would help relieve London's acute shortage of accommodation. But the capital's second, and likelier alternative is for the **Great Britain** to become the headquarters of the City of London Company of Shipwrights — a richly endowed medieval survival. The Company's present offices are threatened with redevelopment and it needs a new home.

Brunel Society's View

Bristol has no eager commercial contenders for the ship. The authorities say that a proper site for the vessel would cost them a 100,000 pounds city centre site of two acres. This would need to produce 10,000 pounds a year to pay for itself — and what about staff, toilet, parking, and all the other costs? The crucial question is "would visitors go to Bristol to see the **Great Britain?**" If they would not, then the volume of attendance would soon be satisfied by local interest and would not increase.

But the Brunel Society thinks that the **Great Britain** could be as big a draw in Bristol as the **Vasa** man-of-war is in Stockholm. The society has as a backing for this argument the 40,000 people who have paid to see the ship — near derelict as she now is — in the few weeks she has been on view.

There will now be a two-year breathing space while restoration work goes on — during which the drawing power of the vessel, and the validity of arguments for ultimate possession are established.

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I enclose $2.30 being *subscription to "The Navy" magazine for 1¾ years (refer notes below).

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CONTRIBUTIONS INVITED

The editor invites persons to submit articles, photographs and drawings (black ink) for inclusion in the magazine, but regrets that no payment can be made for contributions submitted. Contributions should be addressed: The Editor, "The Navy", Box C178, Clarence Street Post Office, Sydney, N.S.W., 2000, Australia.

The Editor does not hold himself responsible for manuscripts, though every effort will be made to return those with which a stamped and addressed envelope is enclosed.

— OUR COVER —

A WINCHESTER class SR.N6 hovercraft of the Imperial Iranian Navy. See feature article entitled: THE ROLE OF HOVERCRAFT IN DEFENCE.

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IN THE NEXT EDITION

Shortage of editorial space precluded the printing of promised special articles featuring the navies of the United States, France, Philippines and Holland. It should be possible to include them in the next edition to be published in June.

NEW AUSTRALIAN DESTROYER ESCORT — H.M.A.S. Torrens

TORRENS proceeds for Contractors Speed Trials.

Australia's newest A.S.W. warship, H.M.A.S. TORRENS commissioned at Gardan Island Naval Dockyard, Sydney on Tuesday, 19 January, 1971.

She became the 56th ship at present serving in the Australian fleet whose ships are operating in areas ranging from Vietnam, Singapore, Malaysia, New Guinea and Australia's 14,000 mile coastline.

H.M.A.S. **Torrens** was built in Sydney by the Cockatoo Docks and Engineering Company Pty. Ltd.

The missile-armed warship is a twin sister to H.M.A.S. **Swan** which commissioned one year ago. The total cost of the two vessels is approximately $60 million, including spares and support equipment.

Under the command of Commander I. W. Knox, R.A.N., a specialist in anti-submarine warfare, **Torrens'** primary role is that of an anti-submarine hunter, for which she is equipped with the Australian designed **Ikara** missile system.

Torrens is also equipped with the Seacat anti-aircraft missile system, two 4.5 inch guns and a triple barrelled anti-submarine depth charge mortar. The new ship incorporates many improvements to increase fighting efficiency, improve working and living conditions aboard and reduce maintenance needs. Her main weapons are controlled by radar and digital computers.

New features include the latest high

Australia's newest warship, H.M.A.S. TORRENS, on speed trials. The 2,700-ton destroyer escort was built in Sydney and was commissioned as the 56th ship of the R.A.N. currently serving in Australian and overseas waters. The Ikara and Seacat missile-equipped ship hoisted the White Ensign for the first time at her Handing Over ceremony off Sydney on Monday, 15 January, 1971.

Australia's newest warship H.M.A.S. TORRENS was officially Handed Over to the R.A.N. by her builders on Monday, 18 January, 1971. The general Red Ensign at her stern was lowered and the Australian White Ensign raised for the first time. The ceremony was held at sea off Sydney in a 30-knot wind. The ship was officially Commissioned as a warship of the R.A.N. on Tuesday, 19 January.

Prayers for a new ship. Two senior chaplains of the Royal Australian Navy performed the Commissioning Service for H.M.A.S. TORRENS. They read the service together. H.M.A.S. TORRENS commanding officer, Commander I. Knox, of Adelaide (centre), read the Commissioning Order. Church of England Archdeacon W. Long (right), performed the service with Roman Catholic Monsignor G. S. Lake.

definition radar units for navigation, long range air control and weapon control systems.

She carries automatic steering facilities with wheel and engine telegraphs for the control of the ship from the bridge.

Torrens is fully air-conditioned and is fitted with stabilizers to reduce hull motion and the extensive use of aluminium in her construction has permitted the building of an extra deck without effecting displacement or stability.

Torrens the destroyer escort, is far removed from Torrens, the torpedo boat destroyer of 1916-1930. The former Torrens displaced 700 tons against the destroyer escort's 2,700 tons; the new ship has a ship's company of 257 officers and sailors as compared with the old Torrens' crew of 69.

Small as she was, the former Torrens had a notable career during the First World War and afterwards.

During World War I, the original H.M.A.S. Torrens commenced with patrol duty off Borneo and Malaya, proceeding to the Mediterranean in August, 1917.

She remained in those waters until January, 1919, when she proceeded to the United Kingdom.

She returned to Australian waters in April, 1919, remaining in commission until August, 1920.

She re-commissioned in June, 1924, finally being paid off in May, 1926.

After dismantling, her hulk was sunk by gunfire off Sydney Heads on 24 November, 1930.

THE FIRST H.M.A.S. TORRENS

Type:
Torpedo Boat Destroyer.
Laid Down:
25/1/1913.
Launched:
28.8/1915
Commissioned:
3/7/1916.
Completed:
17/7/1916.
Length:
250½' (overall).
Beam:
24½'.
Draught:
8'.
Displacement:
700 tons.
Guns:
1 4-inch.
3 12-pdrs.
Torpedo Tubes:
3 18-inch.
Machinery:
Parsons' Turbines.
Boilers:
Yarrow.
Complement:
69.

H.M.A.S. TORRENS — 1971

Type:
Type 12, Destroyer Escort.
Builders:
Cockatoo Docks & Engineering Co. Pty. Ltd., Cockatoo Island, Sydney.
Keel Laid:
August, 1965.
Launched:
28th September, 1968.
Sea Trials:
April, 1970.
Completed:
18th January, 1971.
Length Overall:
372'-0".
Length between perpendiculars:
360'-0".
Breadth, Moulded:
40'-11½".
Depth, Moulded:
28'-3".
Displacement, Deep Load:
About 2,700 tons.
Main Engines:
2 Double reduction geared steam Turbines, manufactured at Cockatoo Dockyard to English Electric design, 2 shafts.
Total S.H.P. of Engines:
30,000.
Speed:
About 30 knots.
Boilers:
2 Babcock & Wilcox, built in the U.K. by Vickers Ltd.
Armament:
Two 4.5" guns in twin mounting SEACAT Surface to air missile launcher, IKARA Anti-submarine missile launcher, Mk.10 Anti-submarine Mortar.
COMPLEMENT:
20 Officers, 237 Senior and Junior Sailors.

"The Civilian Arm of the Navy"

The principal objective of the Navy League of Australia is to stress the vital importance of Sea Power to the Commonwealth of Nations and the important role played by the Royal Australian Navy.

The League, in conjunction with the Commonwealth Naval Board, administers the Australian Sea Cadet Corps, by providing finance and technical sea training for boys who intend to serve in the Naval or Merchant Services, also to those sea-minded boys, who do not intend to follow a sea career, but who given this knowledge will form a valuable reserve for the Naval Service.

We invite you to swell our ranks and so keep up to date with Maritime Affairs to help to build an ever-increasing weight of informed public opinion. The Navy League will then become widely known and exercise an important influence in the life of the Australian Nation.

The League consists of Fellows and Associates. All British subjects who support the objectives of the League are eligible for membership. Members receive copies of the League's magazine "The Navy".

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THE NAVY LEAGUE OF AUSTRALIA

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To: The Secretary,
The Navy League of Australia.

(.....Division)

Sir,

I am desirous of becoming a Member of the Navy League of Australia with whose objects I am in sympathy.

Name (Mr.) (Mrs.) (Miss) (Rank) .....

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Signature..... Date.....

Enclosed is a remittance for $4.20 being my first annual subscription.

AFTER COMPLETION, THIS FORM SHOULD BE DISPATCHED TO YOUR DIVISIONAL SECRETARY – NOTE LIST OF ADDRESSES ABOVE.

Women's Royal Australian Naval Service

Summer rig worn by members of the W.R.A.N.S. On the left is a THIRD OFFICER, W.R.A.N.S., the two girls contra are Leading Wrans, whilst the lass at right, is a Radio Supervisor (a Petty Officer, Communicator).

The Editor is grateful for the assistance rendered by Superintendent J. Streeter, O.B.E. Director, W.R.A.N.S., in the preparation of this article.

More then 600 women in uniform, the majority in the 18 to 20 age group are serving in shore establishments of the Royal Australian Navy, thereby assisting in overcoming manpower shortages and releasing male sailors for service at sea.

They are members of the Women's Royal Australian Naval Service, better known as Wrans. They serve in the Navy in many different roles such as Stewards, Sick Berth Attendants, Cooks, Radio Operators, Writers, Writers (Shorthand Typists), Stores Assistants, Motor Transport Drivers, Radar Plotters and Weapon Assessors.

Wrans are serving in all capital cities in Australia and some are stationed in Darwin and Singapore. They are posted to 9 major Naval Establishments — H.M.A.S. **Albatross**, Naval Air Station at Nowra, 100 miles south of Sydney, H.M.A.S. **Cerberus**, 50 miles from Melbourne, H.M.A.S. **Harman**, near the Nation's Capital, Canberra, H.M.A.S. **Lonsdale** in Melbourne, H.M.A.S. **Coonawarra** in Darwin, H.M.A. Ships **Penguin**, **Kuttabul**, **Waterhen**, and **Watson** in Sydney, where they are employed on a variety of duties which would otherwise have to be undertaken by men.

History will be made should a Wran ever be posted to a Warship at sea, but many Wrans have been to sea for a day to gain an understanding of activities in a ship. Radio Operators have a day at sea to observe the receiving end of the signals they send from the shore stations like Darwin, to ships around the world.

The Royal Australian Navy has found that Wrans can perform some Naval duties more economically and as well as men, therefore they are firmly entrenched as an integral part of the service.

But Wrans were not always as readily accepted as they are today.

The Wrans had small beginnings, in fact it could almost be said that they crept into the Royal Australian Navy without anyone really realising what had happened; certainly there was a strong reluctance to accept that women could be part of such a service as the R.A.N.

Before the Second World War, a group of volunteer women had trained as telegraphists in a body known as the Women's Emergency Signalling Corps. Their mentor, a Mrs. F. V. MacKenzie, O.B.E., of Sydney, soon after the outbreak of war sang the praises of these young women and requested that they enter the R.A.N. as telegraphists. She later won the support of the Director of Signals at Navy Office in her campaign to get the telegraphists employed by the Navy, but approval was not given for their entry as Wrans or to the formation of the service until 18 April, 1941.

Then the Minister for the Navy gave approval for the employment of the 12 telegraphists and two attendants at H.M.A.S. **Harman**, a radio station at Canberra, with the proviso that no publicity be given to this break with tradition.

And so the Women's Royal Australian Navy was formed, although it consisted of only 14 women.

As the war intensified and the drain on manpower increased, the number of Wrans slowly grew.

By October, 1942, Wrans were working at Navy Office, in Melbourne and at Brisbane and Fremantle as well as in Canberra.

Soon applications were invited for writers, typists and clerks and by December, 1942, advertisements appeared in the newspapers stating that Wrans were required urgently as drivers, clerical assistants, storekeepers and office orderlies.

A conference of considerable significance to the Wrans was held at Navy Office in July, 1942, when general conditions of service were discussed. At the time it was thought that no more than 600 Wrans could be absorbed in the service. Later that year, the estimate of

Wrans like life in the tropics of Darwin. Enjoying the sights near H.M.A.S. COONAWARRA, the Naval Communications station near Darwin are Wran Steward, Wanda Watson and Wran Cook, Janice Aldridge

The 883 members of the Women's Royal Australian Naval Service are posted to all parts of Australia including tropical, scenically delightful Darwin, but none is more envied than the seven Wrans with the Royal Australian Navy Communications Detachment in Singapore. Enjoying leave in Singapore are Radio Operator (Teletype) Raylee Nuss (left), and Leading Wran Radio Operator (Morse), Meleida Price.

The career opportunities open to Wrans are many. Here Sick Bay Attendant Vicki Martin works in one of the Royal Australian Navy's many pharmacies.

Wran Suzanne Hartley is typical of the young women in the Wrans performing many important tasks. She is a teletype operator at the Royal Australian Navy Communications station, H.M.A.S. COONAWARRA, near Darwin.

Wrans required had already risen to 1,000.

And so the numbers gradually increased and Wrans performed more and more important tasks.

The need for Wrans officers soon became apparent. The majority of officers had administrative roles and were responsible for the welfare and discipline of Wrans ratings, but some were employed in specialist appointments. Wrans officers were used as accountants, they corrected charts at Naval stations and they were employed in sea transport offices. One Wrans Officer was entrusted with the difficult task of Press Liaison Officer.

As the war dragged on, Wrans undertook a wider and more varied range of activities.

They worked degaussing ranges, they were engaged in secret work of a technical nature and they had to work long hours under exacting conditions and keep silent about their work even after the war was over.

Some Wran writers dealt with top secret details of allied work behind the Japanese lines and had to type out operations orders and assist with the construction of codes and preparation of reports for Allied Headquarters.

Eventually Wrans were serving in all parts of Australia and at war's end, the service was more than 2,000 strong — a far cry from the day of the 12 originally "entered without publicity".

It seemed when the war was over, that the Navy had no further need for the Wrans who had filled so many crucial posts ably and devotedly.

The Women's Royal Australian Navy was disbanded. In July, 1948, the last Wran was paid off.

But post war manning problems necessitated unusual steps being introduced to overcome manpower shortages and the Women's Royal Australian Naval Service was reconstituted in 1951. The reluctance the authorities had shown in the early days of the war to bring women into the Navy had gone.

The Wrans got their final seal of approval in December, 1959, when they were given permanent status, and today, the Royal Australian Navy has 600 women between 18 and 40 years of age in important posts to show that it really believes in women in its ranks.

Great care is taken in the selection of the young women who apply for entry into the W.R.A.N.S. Applications on most occasions far outnumber vacancies and waiting lists are long. Recruit Wrans are entered at six weekly intervals and receive their Recruit training at H.M.A.S. **Cerberus.** Recruit Wrans (Radar Plot), then proceed to H.M.A.S. **Watson,** Recruit Wrans (MTD's), to H.M.A.S. **Albatross,** and Recruit Wrans (Radio Operators), to H.M.A.S. **Harman,** for specialised

Chatting in the cool of their comfortable quarters on the Royal Australian Navy communications station H.M.A.S. COONAWARRA, near Darwin, are three neatly dressed Wrans. They are (from left), Elizabeth Lannstrom, Ann Eassie and Kerry Butcher.

A Junior Wran's cabin, centrally heated, at H.M.A.S. HARMAN. This modern building GLOUCESTER HOUSE was opened by H.R.H. Princess Anne, during the Royal Visit to Australia, in April, 1970.

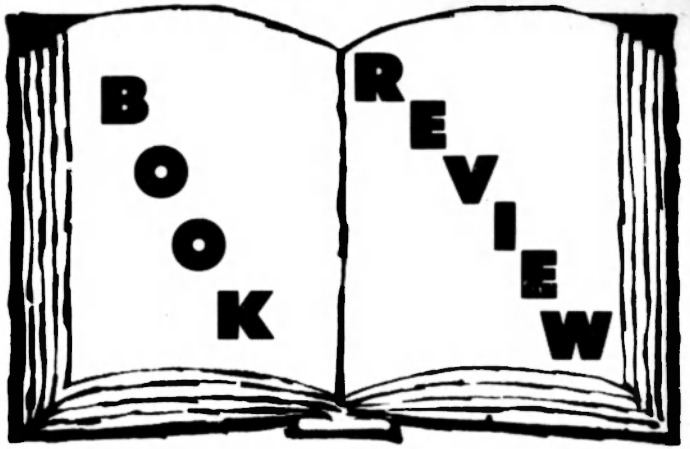
The Women's Royal Australian Naval Service goes forward into the seventies proud of its traditions and its role as an integral part of the Royal Australian Navy.

The Central Staircase, GLOUCESTER HOUSE, H.M.A.S. HARMAN, Canberra

training. On completion of training they may be posted wherever the Naval Board so directs.

Accommodation for Wrans today is a far cry from the unlined dormitory huts of World War II. Modern buildings, single rooms for Senior ranks, washing machines and drying rooms, comfortable recreation and television rooms, gardens, lawns, and parking spaces, as well as well equipped galleys and messing areas provide members of the W.R.A.N.S. with living quarters second to none.

STRIKE FROM THE SEA



A History of British Naval Air Power. **by Robert Jackson** (Published by Arthur Barker Ltd., London. 1970. 225 pages including 16 pages of photographs). **Price: $6.10.** (Copy supplied by Hicks Smith and Sons Pty. Ltd.). Reviewed by: **Stephen H. Scarlett.**

The troubled history of British Naval aviation, from its shaky start to its uncertain future, is well set out in Mr. Johnson's detailed book. The author is an enthusiast and a good storyteller, which facts make his book extremely easy to read.

Whilst it clearly sets out the development of the Fleet Air Arm, showing the planning, the acquisition of aircraft, the interdepartmental struggles and the development of roles and tactics, the book can also be read as a collection of fascinating stories about the Fleet Air Arm's operations, including attacks on Zeppelins, the tragic campaign in Norway in 1940, the disastrous attack on the Battle Cruiser "Scharnhorst" by the doomed Swordfish of Lt. Cdr. Eugene Esmonde V.C., the desperate battles against Japanese Kamikazes, a fascinating account of the Anglo-French Suez Operation of 1956 and a gripping account of an emergency in the air during the Rhodesian crisis. The lovers of detail (as I am) will delight in the three appendices, headed as follows:

(1) Fleet Air Arm Squadrons in Major Combat operations 1939-56;
(2) Aircraft Carriers of the Royal Navy 1919-69; and
(3) Aircraft of the Fleet Air Arm 1924-69.

The text, too, is full of interesting snippets of information, some of which might well belong in the Guinness Book of Records. For instance, how many readers know that the Fleet Air Arm shot down the first enemy aircraft of World War II, and that fighters of the Fleet Air Arm fought the last action between fighter aircraft of World War II? Again, I was interested to see that the present names of the ranks in the Royal Air Force were taken almost completely from those of the Royal Naval Air Service, the forerunner of the Fleet Air Arm.

The faults that mar this book are more those of the publishers than the author. For instance, an editor should have picked up the misprints and mistakes and clumsy pieces of grammar that all appear from time to time. It is irritating, in a book of this quality, to see obvious mistakes, like the rank of a naval flyer called C. R. Sampson, who on page 13 is referred to as a Lieutenant Commander, but on page 4, and in the index is spoken of as a Lieutenant Colonel, of all things. Mr. Jackson's occasional lapses into sentimentality and occasional inexpert use of language should have been corrected before they appeared in print. On page 175 for instance, the author meant to say that in Malaysia, a number of helicopters were destroyed in accidents, but what he actually said was that "a number of helicopters were accidentally written off", which sounds like someone made an enormous clerical error.

The illustrations in the book are good, but they are not good enough. In photograph No. 12, for instance, a blurred shape in the background in the top left-hand corner is identified as the aircraft carrier H.M.S. "Furious", but photograph No. 8 shows an exceptionally good picture of a pre-war carrier which is maddeningly not identified. (My guess is that it is either "Glorious" or "Courageous".)

Again, several of the illustrations are unnecessarily duplicated. There are seven photos of Swordfish and two of Sea Furies (admittedly, they are exceptionally good photos), but no pictures of such well used aircraft as the Fairey Fulmar or the Blackburn Skua. Again, many of the photos of post World War II aircraft are technically good, but rather sterile, manufacturers' photos. Surely, the Imperial War Museum could have provided good pictures of Wyverns or Sea Hawks actually engaged in the Suez Operation, or Westland Whirlwinds or Wessexes at work in Malaysia.

Despite these criticisms, the book is extremely valuable. Mr. Jackson has done a lot of work in putting out a first-class history of the Fleet Air Arm, and even if you do not agree with his outspoken comments in the last chapter you will find them (and the rest of the book), interesting and thought provoking. So buy the book and read it (even if only to tell me the identity of that anonymous aircraft carrier).

CAPTAIN MATTHEW FLINDERS, R.N.

NEW SURVEY SHIP TO BE NAMED FLINDERS

The Royal Australian Navy will name its new hydrographic survey ship after the explorer and navigator Matthew Flinders.

Preliminary work on the new vessel has begun at Williamstown Naval Dockyard, Victoria.

The choice of name is noteworthy because of Flinders' associations with the exploration and charting of the Australian coastline and because this year is the 51st anniversary of the R.A.N.'s Hydrographic Service. Lieutenant Flinders, R.N., was regarded by surveyors as one of the forefathers of modern hydrography. He had produced remarkably accurate charts for his time, and had set a tradition of painstaking accuracy in surveying.

H.M.A.S. Flinders will replace H.M.A.S. Paluma which is nearing the end of her useful life.

When built, Flinders and the hydrographic survey ship H.M.A.S. Moresby which was commissioned in 1964, are expected to complete 100,000 miles of soundings annually with the help of patrol boats.

Flinders will be 161 ft. long, with a breadth of 33 ft. and a displacement of 700 tons. Her ship's company will number 36 officers and sailors.

Diesel powered, she will have modern fixing devices for hydrographic work, and will also be fitted for satellite navigation.

Second Hawker Siddley HARRIER (AV8A) V/STOL Fighter to be delivered to the United States Marine Corps.

First Hawker Siddeley Harrier for U.S. Marine Corps

On Wednesday, 6 January, the first of 12 export Hawker Siddeley HARRIER (AV8A) V/STOL Fighters was handed over to the United States Marine Corps — the first time since World War I that operational military aircraft built in the U.K. have been sold to the United States.

Not since the sale of Camel and Dolphin combat aircraft by Sopwith Aviation (forebears of Hawker Siddeley Aviation) towards the end of World War I, have British-built military aircraft been sold to the United States.

This latest Harrier is the first MK 50 export version of the revolutionary fighter to be delivered anywhere in the world.

It is also first of the initial order of 12 Harriers being built for the United States Marine Corps. There is a programmed follow-up order for a further 18 aircraft for the fiscal year 1971.

Recently introduced into service with the Royal Air Force, Harrier squadrons are based in England and Germany (as part of Britain's NATO defence commitment). The Harrier is in quantity production in the United Kingdom for both the Royal Air Force and United States Marine Corps.

U.S.M.C. pilots and engineers have already gained experience with the Royal Air Force in flying and maintaining the Harrier, as part of a co-operative training programme.

Formation of the first U.S.M.C. squadron is scheduled for April of this year.

The U.S. Marine Harriers are powered by a Rolls-Royce Pegasus vectored thrust turbofan engine, and fitted with the Ferranti FE 541 navigation and attack system. The aircraft can deliver a heavy load of ordinance at speeds of over 600 knots.

Flexibility, mobility and quick reaction is the keynote of the Harrier, which is able to operate from small unsupported sites or from conventional airfields. In the naval application, the fighter can operate from ships equipped with helicopter platforms. This makes the Harrier an aircraft particularly suited to the requirements of the Marines.

The U.S. Marine Corps is tasked especially with developing and maintaining a readiness for amphibious

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The Role of . . . hovercraft in defence

Hovercraft have repeatedly been proved to be versatile, fast and reliable. They have many distinct advantages over other forms of comparable transport, such as the army DUKW and the various classes or types may, for example be used to ferry passengers; to transport freight; for weed and pest control; airfield fire suppression and rescue and as mobile dispensaries/medical centres.

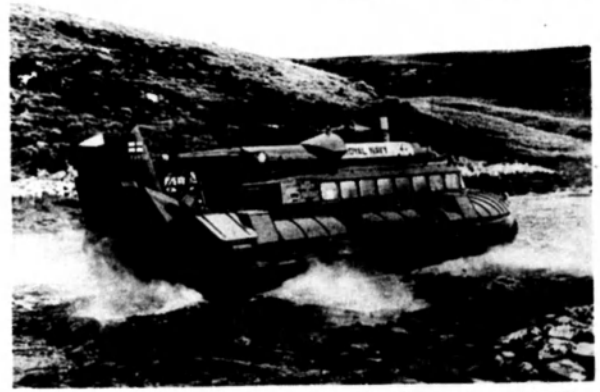
It appears from information currently available that the only country building hovercraft, at least commercially, is Great Britain.

This article deals principally with the military role of the hovercraft, and for purposes of evaluation the **Winchester** class of hovercraft has been examined.

Since the World's first hovercraft production line was established at the British Hovercraft Corporation's factory at East Cowes, England, in 1964, more than 60 craft have been, or are in the process of being built.

In 7 years, a very wide variety of operational experience has been acquired in every continent of the world. To date, more than 60,000 operating hours have been logged by **Warden** and **Winchester** Class hovercraft, of which excess of 17,000 have been on military operations.

A wealth of military experience in the use of the **Winchester** and the smaller **Warden** has been accumulated from actual operations, operational experiments and role developments with craft manned by military units of the British and United States Defence Services, and from joint military and British Hovercraft Corporation trials with forces including the Royal Swedish Navy, and the Finnish Navy and Coast Guard. Trials have been conducted in environments of military significance including the ice-fields of Canada and the deserts of Libya.



An SR.N6 of the Royal Navy. This military variant of the WINCHESTER Class hovercraft is a high-performance, amphibious craft, employing a single engine and an integrated lift-propulsion system. Being truly amphibious, it can operate from relatively unsophisticated bases above the high-water mark, irrespective of the tidal state.

A roof hatch gun position can be located on the port side of the cabin. Provision can also be made for armour plating to protect the engine and vital electrical components and also to give protection against 7,62 mm. ammunition for 20 troops sitting on the cabin floor. The floor has 22 lashing points for securing loads. A small auxiliary electrical generator unit is fitted for use when electrical power is needed for prolonged periods while the main engine is not in use.

Typical uses	Typical military loads
Logistic support	30 armed troops
	or
Troop and weapon carrying	105 mm. howitzer and crew
	or
Coastal patrolling	120 mm. anti-tank gun and crew
	or
Casualty evacuation	3 NATO pallets

Except for the obvious limitations of jungle and mountainous areas, the **Winchester** has been fully proved as a Naval and Military craft for use at sea and through surf, up rivers and over rapids, across beaches, desert and other forms of difficult terrain. In many cases it operates quite easily where the use of conventional vehicles or boats is impossible.

Approximately two years ago, a **Winchester** Class hovercraft on demonstration in South America made the 2,400 mile trip along the Rivers Negro and Orinoco, from Manaus to Trinidad. This was the first time that a powered vehicle had undertaken this journey, and rapids and boulder strewn shallows were easily negotiated.

Warden Class hovercraft, modified for the United States Forces, have been operating for over three years in South Vietnam. In the Mekong Delta area these hovercraft have been found to provide a combat capability that cannot be furnished by any other vehicle or weapons platform in the Army inventory and have enabled the region to be very rapidly cleared of enemy forces.

Intensive commercial operations have illustrated the ability of individual **Winchesters** to operate effectively for extended periods, and have resulted in

very high standards of reliability and serviceability being achieved. Several individual craft have logged over 5,000 power hours.

A **Winchester** Class belonging to the Royal Navy has been stationed in the Falkland Islands, 300 nautical miles North-East of Cape Horn since September, 1967, and has again shown the ability of craft to be operated for extended periods in isolation.

The high overwater speed and amphibious capability of the **Winchester** combine to make it particularly well suited for naval fast attack, coastal defence, army troop and weapon deployment, logistic support and coastguard work.

As a result **Warden** and **Winchester** hovercraft have now become part of the inventory of the British and United States Defence Forces, the Canadian Coastguard, the Imperial Iranian Navy (currently operates the largest single squadron in service — eight **Winchester** SR.N6's), the Italian Armed Forces, the Royal Brunei Malay Defence Forces and the New Zealand Government. The Saudi Arabian Frontier Force has ordered **Winchester** (SR.N6) hovercraft.

ROLES

The fully amphibious quality of the hovercraft makes it suitable for operation from simple bases, and obviates the need to remain at sea for extended periods as conventional craft have been forced to in the past.

The craft can easily be deployed to any beach within its range in readiness for operations in the fast attack role.

On shore, the craft can be kept fully armed and fuelled in a state of instant readiness. Both craft and bases can be camouflaged to avoid visual detection either from seaward or from the air, and by virtue of the shore 'clutter' would be a difficult radar target.

Craft need only carry a crew of three when at sea, and spare crews and support and maintenance personnel can be shore based.

At sea the **Winchester** is as seaworthy as conventional fast patrol boats of comparable size and yet is faster and has a greater freedom of manoeuvre.

Unhindered by variations of tide, current and draught it can operate at high speed right inshore over reefs and shallows and is not confined to deep water or navigable channels.

Using either its own, or shore-based radar it can be directed on to targets by day or night, and in conditions of bad visibility.

An SR.N6 operated by the Royal Corps of Transport — 200 Squadron.

The **Winchester** can be provided with armament ranging from a light machine gun to short range surface-to-surface guided missiles, and thus equipped can perform such tasks as—

- Fishery and Shipping protection.
- Interception and attack of enemy forces.
- Control of illegal immigration.
- Anti-smuggling work.

The **Winchester** can transport detachments of up to 20 troops or police and their support weapons either to carry out military or police actions, or to assist in coastal patrolling. These detachments can be deployed rapidly over land or water in areas where movement by ordinary surface means is slow, difficult and even impossible, and when weather conditions may limit the use of helicopters. Tactically, therefore, the advantage of surprise can be coupled with speed into action for—

- Landing of troops in tactical or ambush positions in a 'battle ready' condition.
- Relief of outposts.
- Evacuation of casualties.

The **Winchester's** unparalleled amphibious capability enables loads to be carried at high speed over water or difficult terrain, thus giving a very high work factor. For logistic support, the craft can give a very rapid rate of build-up and make a material contribution to tactical mobility and invulnerability.

The simplicity of the payload area in the craft means that conversion from one role to another can be effected simply and quickly. In emergency food and medical supplies can be carried or craft can be equipped as medical posts or ambulances.

The **Winchester** can be equipped as a search and rescue craft for both crashed aircraft and marine rescue operations. Its high speed, amphibious, all-weather capability and its overload capacity for short range work, make it particulary versatile and a suitable vehicle for this role. In an emergency up to 50 survivors can be carried for short distances.

To summarise, hovercraft can carry out a variety of military and para-military tasks, including:—

- Coastal defence.
- Shipping and fishery protection.
- Anti-smuggling and anti-insurgent operations.
- Amphibious police actions.
- Troop and weapon deployment.
- Casualty evacuation.
- Logistic support.
- Emergency aid and disaster relief.
- Search and rescue.

MILITARY ADVANTAGES

The military effectiveness of the **Winchester** lies in its unique combination of qualities, which are outlined below.—

Can operate at speeds up to 55 knots over water, land and marginal terrain.

The transition from water to land is achieved without loss of speed Operations over surfaces including surf, rapids, reefs, beaches, marshes, ice, snow and desert have proved feasible.

Can be operated by a crew of 3 for short missions and by a crew of 5 for longer missions and night time operations.

The **Winchester** has been proved to be capable of protracted operation in remote areas such as the Falkland Islands, the Amazon River, and South Vietnam, where it has gained a

reputation for reliability and dependability.

A single craft can readily be used for fast attack and interception, troop and equipment carrying, freight carrying or casualty evacuation.

The Winchester has a single engine, a single fan and a single propeller, the minimum requirements for an amphibious hovercraft. In the field maintenance is easily carried out, and consists of relatively simple operations.

The Winchester achieves partial invulnerability through its speed and ability to surprise an enemy. Armour plate can protect the crew, engine and vital electrical components from small arms fire. Operational experience has shown that craft can continue to operate effectively with considerable skirt and hull damage.

obstacles 3 ft. high to be crossed at speed. Control is aerodynamic and there is no need for either water immersion or ground contact.

Structure

The craft is made in three sections. The central part incorporating cabin engine, fan, fuel and control systems carries the longitudinal bending loads. The two detachable outboard sections, fitted one on each side of this, are buoyancy tanks, and also carry the air from the fan to the flexible skirts.

It can thus be quickly dismantled and reassembled for air or road transport.

Construction is mainly of aluminium alloy, but steel is used for certain highly stressed parts. All metal parts are specially treated to eliminate corrosion. The plenum air intake, and auxiliary panniers are made from glass reinforced plastic. A specially developed composite material is used for the flexible skirts giving them great durability.

One of the eight SR.N6 hovercraft operated by the Imperial Iranian Navy.

THE BASIC CRAFT

The Military version of the Winchester Class is based on the well proven Warden (SR.N5), and the civil Winchester (SR.N6), which has established an international reputation for comfort and reliability. It is a design which is now fully developed and has been shown to be able to withstand the rigours of operational service in all parts of the world. Maintenance has been reduced to the minimum and minor repairs are easily made, away from base.

Engineering

The Winchester Class hovercraft is 48 ft. long and 23 ft. wide, with a maximum overload all-up weight of 10.5 tons. It is powered by a single gas turbine engine. It is fitted with 4 ft. deep flexible skirts giving a smooth ride over waves and rough country and enabling

Machinery

The main power unit is a single Rolls-Royce BS Gn 1051 Marine Gnome free turbine, with a continuous rating of 900 S.H.P. in I.S.A. conditions. Mounted on the craft centreline to the rear of the cabin it drives both lift fan and propeller through two gearboxes. Power is apportioned between lift and propulsion by using the controllable pitch airscrew.

Control

Directional control is achieved by moving rudders which operate in the propeller slipstream. Air is bled from the plenum chamber and ducted over the lower portion of the rudders to improve their effectiveness at low forward speeds. Additional control at low speed is provided by an hydraulically operated skirt lifting system and side control ports.

Fore and aft trim can be adjusted by a fuel ballast transfer system and an elevator which operates between the rudders.

Fuel System

The main fuel supply is carried in a flexible bag tank mounted on a bay aft of the rear cabin bulkhead. The usable capacity is 265 Imperial gallons.

Up to four additional fuel tanks, each of 100 Imperial gallon capacity, can be mounted externally and are connected to the main tank, giving a total fuel capacity excluding ballast of 665 Imperial gallons.

Any of the aviation kerosene fuels AVTAG, AVTUR or AVCAT may be used.

Electrical Systems

A brushless generator driven off the propulsion engine provides a 28 volt D.C. with negative earth return, and has a capacity of 140 amps.

Two 24-volt 25 amp hour batteries give sufficient power for six engine starts without recharging.

Three phase A.C. of 400 Hz at 114 volts for the electronic equipment is obtained from an inverter.

LOGISTIC SUPPORT VARIANT

The logistic support variant of the Winchester Class hovercraft has been developed as a general purpose military transport vehicle. Its main feature is a large roof hatch which enables the craft to be loaded by crane when lying alongside a quay or a ship.

The specification includes the following features:—

Structure:

Large cabin roof hatch for overhead loading of stores and equipment. Bow loading door and ramp. Side deck loading racks.

Armament:

Roof mounted machine gun position to take 7,62 mm. or 0.5 inch weapon.

Armour:

Armour protection of vital parts and applique armour for cabin.

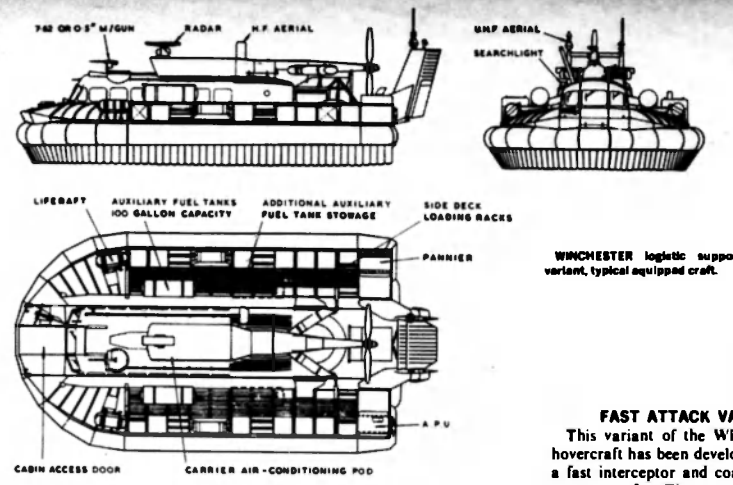
Communications:

A variety of H.F., U.H.F., V.H.F., and conventional short wave radio equipment can be fitted — Radar, Gyro compass, Auxiliary (standby) electrical generating unit.

Leading Particulars:

Dimensions—

Overall length — 48 ft. 5 in.
Overall beam — 23 ft.

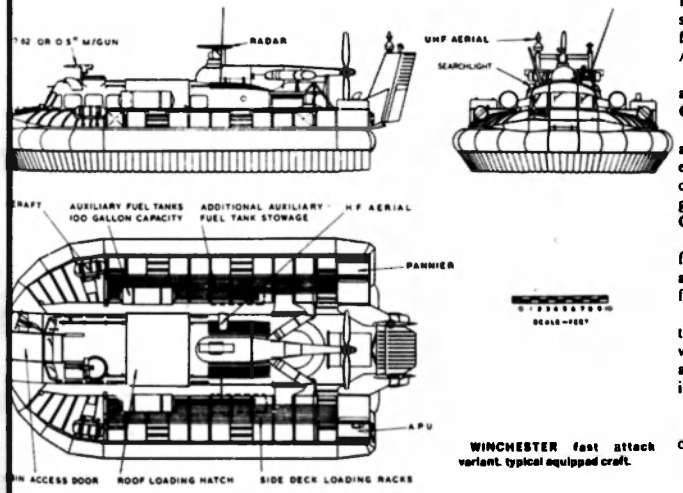


WINCHESTER logistic support variant, typical equipped craft.

Overall height on landing pads — 15 ft.
Cabin size (length x width) — 19 ft. x 7 ft. 8 in.
Cabin headroom — centre line — 6 ft.
Roof hatch size (length x width) — 7 ft. x 7 ft. 8 in.
Door aperture size (height x width) — 5 ft. 9 in. x 3 ft. 3 in.
Skirt length — 4 ft.

Power plant and systems:
Engine — Rolls-Royce Marine Gnome gas turbine — Max. continuous rating at 15 deg. Centigrade — 900 s.h.p.
Propeller — Dowty Rotol, 4-blade, variable pitch, 9 ft. diameter.
Lift fan — BHC, 12-blade, centrifugal, 7 ft. diameter.
Basic fuel capacity — 265 Imperial gallons.
Additional fuel capacity — 200 Imperial gallons or 400 Imperial gallons externally.

Weights:
Normal A.U.W. — 22,400 lb.
Maximum A.U.W. — 24,000 lb.



WINCHESTER fast attack variant, typical equipped craft.

FAST ATTACK VARIANT

This variant of the Winchester Class hovercraft has been developed for use as a fast interceptor and coastal and river patrol craft. The emphasis is on armament, range, and crew comfort rather than load carrying ability.

The specification includes the following features:—

Structure:
Bow access door and ramp.
Side deck loading racks.

Armament:
(a) Roof mounted machine gun position to take 7.62 mm. or 0.5 inch weapon.
(b) Manually operated 20 mm. gun turret, or as a possible additional fit, four Nord SS.11 wire-guided surface to surface guided missiles mounted in twin fixed launchers on either side deck.

Armour:
Armour protection of vital parts and applique armour for cabin.

Communications:
A variety of H.F., U.H.F., V.H.F., and conventional short-wave radio equipment can be fitted. Radar. Gyro compass. Auxiliary 'standby' electrical generating unit.

Cabin Equipment:
Cabin air conditioning. Cooking facilities including: stove, refrigerator and fresh water stowage. Sanitary facilities.

The **LEADING PARTICULARS** of the Fast Attack and Logistic Support variants are identical, except for the addition of a 6 ton air-conditioning unit in the Attack variant.

MANNING

The Winchester requires a basic crew of three which consists of:—
Commander/Hoverpilot.
Navigator/Radar Operator.

Crewman/Gunner.

For lengthy continuous operations, a second radar operator is required, and for night operations, a relief Hoverpilot trained in instrument and radar control techniques should be carried.

When deployed away from base for extended periods, a service engineer should be included to carry out routine servicing, and so make the craft a self-contained unit.

The number of complete crews required for each hovercraft would depend on the number of craft operating and the nature of the proposed operation.

Base Manning:

The provision of service engineers will depend on the number of craft involved, the number and distribution of bases, and the intensity of operation. For the maintenance and servicing of two craft, the average requirements are a staff of five service engineers with four unskilled maintenance assistants.

The service engineers should include:—

Electrician (1).
Radio/Radar mechanic (1).
Aircraft engineers (3).

For intensive operations involving shift work, the numbers have to be increased accordingly.

At the main base, additional personnel are required for supervision including an engineer officer, armourer, storemen, clerk and general duty man.

A MINTECH BH.7 operated by the Royal Navy.

BASES

Bases for hovercraft are very simple compared with those for other forms of craft, and can vary from an open beach or an area of flat ground, to a concrete slipway with hardstandings and hangar-type covered accommodation.

A permanent marine hovercraft base must be ideally sited to provide an easy and unobstructed approach across sheltered water to the slipway. Ideally, the prevailing wind direction should be offshore to facilitate manoeuvring of the craft on the slipway. If there is a significant tidal range, a sandy approach is favoured, the slipway extending to just below the high water mark. Reasonable road access for the use of fuel tankers and supply trucks is essential. Facilities for the use of a launch are desirable.

A typical Main Base suitable for the operation of four Winchesters would include stores building, control tower, hangar, and workshop accommodation. Fresh water and an electrical supply are required.

In forward areas, all that is required is a fuel dump, ammunition supply and engine washing rig.

Model of the WELLINGTON Class, BH.7, fast attack version showing missile installations for SEACAT and BLOWPIPE.

THE BH.N7 TAKES SHAPE

The Wellington BH.N7, Mk 2, a 48-ton hovercraft, has been built for the British Ministry of Technology and the Mk 4 design, together with the 002 and 003 are destined for the Imperial Iranian Navy. These craft are fitted with a bow door and are much wider outboard, so that weapons may be mounted. All craft have the same basic hull structure, powerplant and systems. Spacing of the twin fore and aft main bulkheads and the bow door when fitted was dictated by an army requirement for loading two lorries side-by-side. The bulkheads run the length of the craft and are tied to the transverse frames and bulkheads.

Of the four craft laid down, only the first will have no bow door. The second and third craft may well be vastly different in the design of the superstructure depending on the amount and type of weapons carried. The fourth craft, as yet unsold, will be built by B.H.C. as a private venture and probably used as a development craft. It is likely to look like the first craft, but having a bow door, will probably be in a

civil configuration with a capacity for eight cars and up to 70 passengers.

BH.7 LEADING PARTICULARS

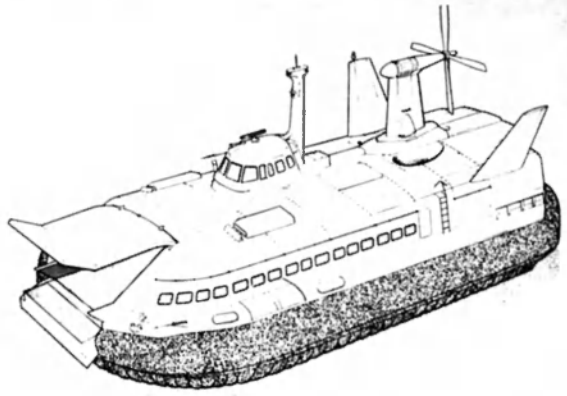
Performance (at normal gross weight at 15 deg. Centigrade). Max. waterspeed over calm water, zero wind (cont. power rating), 65kt; average service waterspeed in coastal waters, 35kt to 40kt; endurance on 850 Imp. gal. fuel, 3 hours.

Dimensions: Overall length, 77 ft. 2 in.; overall beam, 45 ft. 6 in.; overall height on landing pads, 33 ft.; bow door size, 13 ft. 9 in. x 7 ft. 3 in.; vehicle deck headroom on centreline, 7 ft. 10 in.; skirt length, 5 ft. 6 in.

Powerplant and systems: Main engine, Rolls-Royce Marine Proteus gas turbine; max. continuous rating at 15 deg. Centigrade, 3,400 s.h.p.; auxiliary power unit, Rover 1S/90 gas turbine; propeller, Hawker Siddeley Dynamics, four-blade, variable pitch, 19 ft. dia.; lift fan, BHC., 12-blade, centrifugal, 11 ft. 6 in. dia.; normal fuel capacity, 850 Imp. gal.

Weights: Normal gross weight, 48 tons; payload, 15 tons (approx.).

(The Editor invites comment from readers, particularly views regarding the possible use of hovercraft by the Royal Australian Navy).

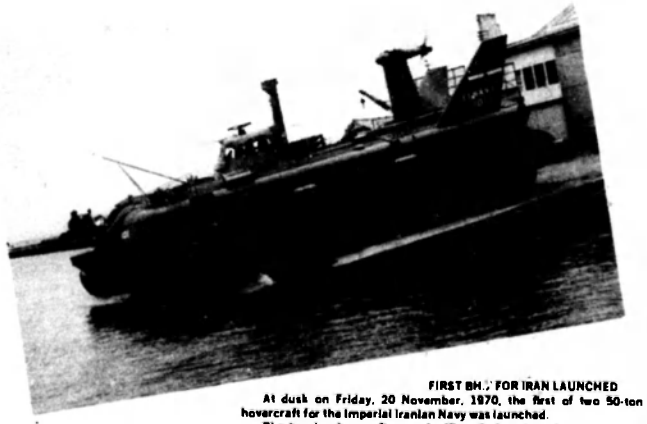


A line drawing of the BH.7 showing opening bow doors. The WELLINGTON BH.7, is a medium-sized, single-engined hovercraft designed to fill the gap between the 9-ton WINCHESTER and the 165-ton Mountbatten. It has a nominal gross weight of 45 tons and is capable of overloading to 50 tons.

The form of construction of the buoyancy tank and components such as the fan, are similar to those used in the Mountbatten. The engine, transmission, gearboxes and propeller are identical to those used in the larger craft.

Because of the large cabin floor area of over 1,000 square feet generally unobstructed except by the two main longitudinal walls, operational layouts can be arranged to meet particular requirements. In a typical layout, the operations room is directly beneath the control cabin and contains communication, navigation, search and strike electronic equipment and associated displays. Armament could include a rapid-fire medium calibre gun with full fire control and/or surface to surface or surface to air missile installations.

The craft has a maximum endurance of 11 hours under cruise conditions but this can be considerably extended on operations as it can remain 'on watch' without using the main engine. There is also accommodation for the crew to live on board for several days.



FIRST BH.7 FOR IRAN LAUNCHED

At dusk on Friday, 20 November, 1970, the first of two 50-ton WELLINGTON (BH.7) Class hovercraft for the Imperial Iranian Navy was launched.

The two Iranian craft vary significantly in external appearance from the British craft in that they both feature a large bow loading door for logistic support duties.

These craft are part of a 3½ million pounds contract with the I.I.N. which also covers the supply of eight 10-ton WINCHESTER (SR.N6) Class hovercraft. These latter craft have already been delivered and now form the largest fully-operational hovercraft squadron in the world.

THE NAVY LEAGUE OF AUSTRALIA

VICTORIAN DIVISION

Report of the President...

Ladies and Gentlemen,

I submit for your consideration my report on the activities of the Navy League in Victoria during the period 1 July, 1969, to 30 June, 1970.

Members will be aware that the Navy League of Australia has two quite separate functions: Firstly, to advocate the maintenance of adequate Naval Forces to ensure the safety of the Country: secondly, to operate the Australian Sea Cadet Corps in conjunction with the Royal Australian Navy.

For various reasons, the League in the past has tended to concentrate its activities on Sea Cadet affairs: This is quite natural — sound youth-training is recognised to be very important; it can be rewarding to those engaged in it, and one generally sees some tangible result for the effort made.

On the other hand, the advocacy of a strong Navy by a comparatively small group of citizens such as ourselves appears to be a daunting task, and possibly an unnecessary one — after all, the Navy employs people to do its publicity work: As well, there are those who suggest that laymen should not dabble in defence matters, but in this sophisticated age, leave it to the Government and its expert advisors.

My own and perhaps rather naive view is that unless a substantial section of the community feels the need for Defence Forces, or any particular Service, the best intentions of Governments and experts will be frustrated. In this respect, I believe the Navy League can be a considerable asset to the Royal Australian Navy as a body influencing public opinion.

At the present time, the realization that sea-power and Navies are not out-of-date is fairly widespread: Publicity given to the sea activities of Russia and the consequential reactions of the United Kingdom and other countries is, I think, largely responsible for this situation.

Public memory and active Press reporting can however be of relatively short duration, whereas Naval building programmes require much forward-thinking and sustained support year in and year out.

During much of the nineteen-sixties, the Royal Australian Navy has not had the wholehearted support of the Australian public. The Navy, tending to live in a world of its own is not blameless; nor are we in the Navy League, who knew something of the Navy's problems, but not enough to act as communicator between Service and public.

I have remarked on these matters at some length because I believe that in the past twelve months, the first signs that the Australian Navy has a coherent civilian support group behind it have become evident: The diverse ex-Navy groups have drawn closer together, there is increasing co-operation between the Naval Association and the Navy League; and the League itself has become more representative and we are certainly much better informed.

Particularly gratifying is the fact that much of the initiative for these changes has come from the Navy, and in concluding these remarks, I must express admiration for the foresight and encouragement of Vice-Admiral Sir Victor Smith, and acknowledge the splendid work in Victoria of Commodore Ian Purvis.

I am pleased to say that the League's Navy activities have not been at the expense of the Australian Sea Cadet Corps, and although I have said that advocacy of the R.A.N., and the operation of the A.S.C.C. are separate functions of the Navy League, to some extent they are complementary, especially in the country areas out of range of Naval Shore Establishments. In these areas the Sea Cadets are the Navy so far as the local community is concerned.

Although my report on the Australian Sea Cadet Corps was one of the factors which caused the Naval Board to decide to assume complete responsibility for the A.S.C.C. (and this has not yet happened), I subsequently submitted that the League should retain responsibility for the civilian committees attached to Units: This has not yet been resolved.

THE LADIES' COMMITTEE

As you will see in the Statement of Income and Expenditure, the largest single item of income is attributable to the Ladies' Committee. We owe a great deal to this quite small group and without their efforts, the League would have founded years ago; it is doubtful in fact if the Navy would have had any Sea Cadets to take over.

Betty Plunkett-Cole put a tremendous amount of work into the Committee during her term as President, and now Rona Hatfield is doing the same. Every member of the League must support this Committee and show that its efforts are appreciated.

AUSTRALIAN SEA CADET CORPS

Following a decision some years ago to stabilize the strength of the A.S.C.C. pending rationalisation, we have kept the number to about 340 members. The very long delay in legislating for Naval control of the Sea Cadet Corps is causing increasing concern and we must, I believe look at the situation very clearly next year, and permit the Corps to form again in Victoria.

I wish to make it quite clear that, irrespective of when the A.S.C.C. comes under Naval control, for many years to come the Corps will require the financial support of the League.

Even if the Navy is authorised to assume control tomorrow, it will take several years to properly accommodate existing Units, let alone provide buildings and facilities for new Units.

In concluding this rather long report, I express my appreciation of the support of the Executive Committee throughout the year, and also the excellent work performed by the R.A.N. Liaison Officer for Sea Cadets, Lieutenant Commander John Hines.

Last but certainly not least, the Executive and I are extremely grateful to Miss Shorrocks for all that she does for the Navy League; I personally could not do without our lady Secretary, and it is rather extraordinary that she has managed to put up with me for the past 3 years without an occasional complaint.

F. G. EVANS,
President.

JOIN THE
AUSTRALIAN SEA CADET CORPS

If you are between the ages of 13 and 18 years

The Australian Sea Cadet Corps is a voluntary organisation administered by the Commonwealth Naval Board and The Navy League of Australia.

The aim of the Australian Sea Cadet Corps is to provide for the spiritual, social and educational welfare of boys and to develop in them character, a sense of patriotism, self-reliance, citizenship and discipline.

Uniforms are supplied free of charge.

Cadets are required to produce a certificate from their doctor to confirm they are capable of carrying out the normal duties and activities of the Cadet Corps. If injured while on duty, Cadets are considered for payment of compensation.

Parades are held on Saturday afternoons and certain Units hold an additional parade one night a week.

The interesting syllabus of training covers a wide sphere and includes seamanship, handling of boats under sail and power, navigation, physical training, rifle shooting, signalling, splicing of wire and ropes, general sporting activities and other varied subjects.

Instructional camps are arranged for Sea Cadets in Naval Establishments, and they are also given opportunities, whenever possible, to undertake training at sea in ships of the Royal Australian Navy.

Cadets, if considering a sea career, are given every assistance to join the Royal Australian Navy, the Mercantile Marine or the Royal Australian Naval Reserve, but there is no compulsion to join these Services.

For further information please contact the Divisional Senior Officer in your State, using the Form provided below.

Senior Officers, Australian Sea Cadet Corps

NEW SOUTH WALES: Staff Office Cadets, H.M.A.S. Watson, Watsons Bay, N.S.W., 2030.

QUEENSLAND: C/- 39 Pinecroft Street, Camp Hill, Queensland, 4152.

WESTERN AUSTRALIA: C/- 182 Cooder St., Como, 6152.

SOUTH AUSTRALIA: C/- Box 1529M, G.P.O., Adelaide, 5001.

VICTORIA: C/- Room 6, 2nd Floor, 528 Collins St., Melbourne, 3000.

AUSTRALIAN CAPITAL TERRITORY: Industry House, National Circuit, Barton, 2600.

NORTHERN TERRITORY: Mrs. V. M. Slide, 12 Allen Street, Fannie Bay, 5790.

TO: The Senior Officer,
Australian Sea Cadet Corps

I am interested in joining the Australian Sea Cadet Corps and would be pleased to receive further information.

NAME.....

STREET..... SUBURB.....

STATE OR TERRITORY..... POST CODE.....

PHONE No..... AGE.....

(Please Print Clearly)

Please address your envelope to the Senior Officer in your State or Territory —see list of addresses above

Naval Cadet Force News

NEW SOUTH WALES

QUARTERLY REPORT OF PROCEEDINGS

This report is for the period 1 October to 31 December, 1970, and covers Continuous Training, Weekend Training, and other activities carried out by the Naval Reserve Cadets in New South Wales.

Continuous Training postings were held in the following Establishments:—

Establishment	Dates	Activity	No. of Personnel
Snapper Island	24 Nov.-5 Dec.	Continuous Training	50
H.M.A.S. Albatross	13-23 Dec.	Physical Trainer's Course	12
H.M.A.S. Albatross	13-23 Dec.	Naval Airman's Course	33
H.M.A.S. Watson	13-23 Dec.	Cookery Course	14
H.M.A.S. Watson	13-23 Dec.	Seaman Gunner's Course	42
H.M.A.S. Creswell	13-23 Dec.	Boat Charge Certificate Course	33
Snapper Island	13-23 Dec.	Higher Rank's Course	54
H.M.A.S. Nirimba	17-23 Dec.	Engineering Mechanic's Course	22
H.M.A.S. Nirimba	17-23 Dec.	General Training	42

Due to the shortage of billets for training during the school vacation, keen competition existed for the training offered and many Cadets were unable to attend some form of Continuous Training.

Weekend Training took place in the following H.M.A. Ships and Shore Establishments:—

Ship/Establishment	Dates	No. of Personnel
H.M.A.S. Melbourne	16-18 Oct.	30
H.M.A.S. Curlew	16-18 Oct.	6
H.M.A.S. Ibis	16-18 Oct.	6
H.M.A.S. Penguin	5- 7 Nov.	45
H.M.A.S. Hobart	13-15 Nov.	12

At the Annual Seafarers' Service held in St. Andrews Cathedral on Sunday, 25 October, over 100 Cadets played an active part in the proceedings by acting as flag bearers. The R.A.N.R. Band was in attendance. Favourable comments were received from both dignitaries and notabilities on the bearing and smart appearance of the Cadets and on the excellence of the Reserve Band performance.

The Annual Pulling and Sailing Regatta was held on Saturday, 7 November. All Courses were laid off Snapper Island and the facilities of T.S. Sydney made available for spectators. Good support was received from both parents and friends of Cadets. The main event of the day was won by T.S. Tobruk (Newcastle Unit). The whalers were immaculate and a great deal of thanks is due those who spent many long hours working on the boats under the able and professional guidance and assistance of Sea Cadet Commander Forsythe. Appreciation must also be extended to H.M.A.S. Nirimba for their invaluable assistance in sharing the work load.

Approval was sought and obtained from the Naval Board to commence sections of Open Cadet Units in James Cook High School, Kogarah and Barrenjoey High School, Avalon Beach. These School Sections will become operational early in 1971.

On Saturday, 10 October, the Director of Naval Reserves carried out an inspection of T.S. Albatross (Wollongong Unit) the most efficient Unit in New South Wales.

(Sgd.) L. MACKAY-CRUISE,
Commander, R.A.N.R.,
Senior Officer.

AUSTRALIAN SEA CADET CORPS NEWS

VICTORIA

haler being launched at T.S. VOYAGER, showing part of the Unit Headquarters and guests.

he Colour party pass cadets from T.S. MELBOURNE and VOYAGER at the commemorative ce at the Shrine of Remembrance, Melbourne.

Cadets at T.S. MELBOURNE being instructed in morse on Open Day.

On 23 August, 1970, 30 Cadets selected from all Victorian Units and two Petty Officer Instructors commenced a seven day continuous training course at H.M.A.S. Cerberus. The Cadets took part in normal Depot routine, and were instructed in practical boatwork, survival at sea and learnt about various types of ships and their purpose to the Navy. This type of training is most valuable to the Cadets, and it is hoped that more programmes of this nature can be arranged in the not-too-distant future.

During Navy Week, Units took part in local functions as well as the main commemorative church and Shrine services, in Melbourne.

On Thursday, 1 October, Cadets from T.S. Melbourne and Voyager formed the guard of honour at the Royale Ballroom for the annual Dinner Dance of the Navy League. Congratulations must be passed on to these Cadets for the fine way in which they carried out this duty.

Saturday, the 3rd — T.S. Barwon, Melbourne and Voyager held open day. This being the first time that Units had been asked by the Navy to take an active part in Navy Week. Although the weather was not the kindest, good attendances by the public were reported from the three Units. Rain at Geelong delayed the simulated rescue of a man overboard, and caused the cancellation of the 14 ft. motorised dinghies putting to sea. T.S. Melbourne and T.S. Voyager however were a lot luckier, the rain holding off long enough for all the planned activities to be carried out.

Sunday, the 4th — Officers and Cadets from T.S. Barwon took part in a march through the streets of Geelong to the War Memorial arranged by the Naval Association. The service was conducted by the vice-president of the Naval Association of Geelong — Mr. H. W. Birrell, M.L.A. Following the service, wreaths were laid at the memorial.

Cadets in Melbourne took part in the Seafarers' service at St. Paul's Cathedral in the morning, and in the afternoon, assembled at the Shrine of Rememberance for the final service of Navy Week.

Above:
Cadet Ian Fisher prepares to slip the ropes on corvette H.M.A.S. CASTLEMAINE, during the seven day training course at H.M.A.S. CERBERUS

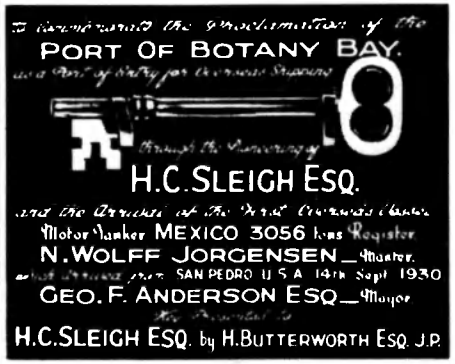
Left:
The Governor of Victoria, Sir Rohan Delacombe and Lady Delacombe leave St. Paul's Cathedral after the Seafarers' service, flanked by Cadets carrying the shipping companies house flags.

Bound for Botany Bay.

In April, 1770, a lone sailing vessel mastered by Captain James Cook set anchor in the virginal waters of a huge cove on the eastern coast of Australia.

It was one of the most important discoveries in Australia's history.

Cook named it Botany Bay.



In September, 1930, the Commonwealth Government Customs erected this rather odd-looking sign in honour of Mr. H. C. Sleigh. It was to mark yet another historic moment for Botany Bay—the legislation and arrival of the first overseas petroleum tanker. Harold Crofton Sleigh was the man responsible. He had seen the potential of Botany Bay, and it was his dream to see it become a thriving industrial port. From his foresight, planning and ingenuity evolved one of Australia's largest petroleum companies . . . Golden Fleece.

GOLDEN FLEECE

S3081

RETROSPECT

The following photographs taken at the International Naval Sea Cadet visit to Washington, D.C., U.S.A., 19-24 August, 1967, have recently been made available. The officers and cadets were the guests of the Secretary of the Navy for the 6 day visit.

Photographs show former U.S. President, Lyndon B. Johnson meeting with representatives of the international contingents represented.

New Warship Recalls Old Guardian of South Australia's Shores

The naming of the Royal Australian Navy's new stores ship H.M.A.S. Protector, recalls Australia's first warship of the name, a small gunboat, little longer than a present day minesweeper and top heavy with guns.

Originally purchased for 65,000 pounds by the Government of South Australia to guard its shores, the gunboat arrived in South Australian waters on 30 September, 1884.

She must have been an impressive sight, and brought a sense of warm reassurance to the colonists who welcomed her.

Her armament included an 8 inch Woolwich-Armstrong rifled breech-load gun, nearly 19 feet long and weighing 13 tons. She also had five 6 inch Woolwich-Armstrong guns, four 3 pounder 1.85 calibre Hotchkiss quick-firing guns and five 10 barrel Gatling machine guns.

Stored in her armory were 200, .45 inch Martini-Henri rifles, 100 breech load revolvers, 100 cutlasses and finally an item not included in present-day warship inventories — 30 boarding pikes.

Of steel construction, Protector was 180 feet 6 inches in length with a beam of 30 feet and draught of 12½ feet. Twin screws could propel her at a maximum speed of 14 knots, though she was originally rigged as a topsail schooner to conserve coal.

Her first commanding officer was Commander J. C. P. Walcott, a retired Royal Navy Officer who commanded the South Australian Naval forces from 1884-1893, when he handed over to Commander W. R. Creswell (later Vice Admiral Sir William Creswell). Creswell, after whom the Royal Australian Naval College at Jervis Bay is named, was Director of Naval Forces and Member of the Naval Board from 1905-1911, and was First Naval Member of the Commonwealth Naval Board from 1911 until he retired in 1919.

In 1900, Protector was offered to the Imperial Government for China service as part of the Colonial Naval Forces raised to assist in subduing the Boxer Rebellion. She thus became Australia's first warship to sail from Australia on active war service.

She performed useful work as a survey vessel and carried despatches in the Gulf of Pechili, but returned to Australia in time to participate in the ceremonies inaugurating the Australian Commonwealth during January, 1901. On 11 March, 1901, Protector together with all other State Naval Forces was transferred to the Commonwealth.

As a Commonwealth Naval vessel she was used to train the Naval Militia Forces of New South Wales, Victoria and South Australia. Her role as a training ship continued following the foundation of the Royal Australian Navy in 1911 and during the period 1911-1913 she was constantly on sea-going service on the Australian coast.

Creswell as a Captain. Former Commanding Officer of the South Australian gunboat PROTECTOR, he later became First Naval Member of the Australian Commonwealth Naval Board.

In September, 1913, Protector became a tender to the Naval Depot, H.M.A.S. Cerberus, then at Williamstown, Victoria.

At the outbreak of World War I, she was rearmed with two-4 inch guns, two 12 pounders and four 3 pounders, and was sent to Sydney to act as parent ship to the Australian submarines AE1 and AE2.

Later in the war, she was sent to the Cocos Islands in the Indian Ocean to report on the wreck of the German cruiser Emden which had been driven aground by H.M.A.S. Sydney, but spent the remaining period of war in Victorian waters.

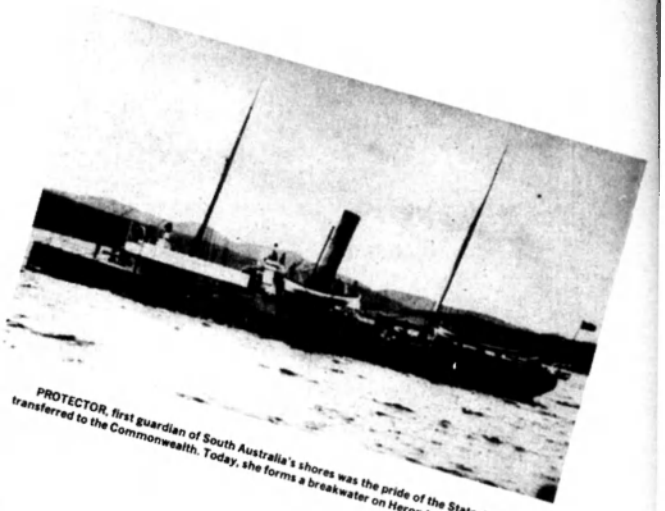
After the war, Protector continued to serve as tender to H.M.A.S. Cerberus, but on 1 April, 1921, she was renamed H.M.A.S. Cerberus and became tender to Flinders Naval Depot, Westernport, Victoria, for the closing stages of her Naval career.

She was paid off for disposal in June, 1924. After varied civilian employment, the old ship was requisitioned for war service in July, 1943, by the United States Army. While under tow to New Guinea, she was damaged in a collision with a tug off Gladstone and abandoned.

A new 20,000 ton fast combat support ship for the Royal Australian Navy, still on the drawing board, is to be named Protector.

When completed, she will supply ships of the Royal Australian Navy at sea, enabling them to remain away from base facilities for long periods.

Complete details of the Protector including artist's impressions of the new vessel were featured on pages 17 and 19 in the August-September-October, 1969 edition of "The Navy" magazine.



PROTECTOR, first guardian of South Australia's shores was the pride of the State. Later she was transferred to the Commonwealth. Today, she forms a breakwater on Heron Island, Queensland.

Two New Vosper Thornycroft Corvette Designs

Model of the Vosper Thornycroft Mark 8 fast corvette.

Outline designs for two completely new, fast corvettes have been prepared by Vosper Thornycroft to bridge the gap in the company's range which exists between the 600-ton Mark 3 corvette and the 1200-ton Mark 5 frigate. They are also designed for speeds intermediate between the 25 knots of the Mark 3 and the 40 knots of the Mark 5.

The Mark 8 design is for a ship 240 feet long, displacing 850 tons, with twin-screw CODOG machinery. This consists of one Rolls-Royce Olympus gas turbine driving both shafts through reduction gearing, for the top speed of 32 knots, with the alternative of Paxman diesel engines, one to each shaft, for speeds of up to 19½ knots. Cruising range at 16 knots is 3500 nautical miles.

A typical armament for the Mark 8 would be an Oto Melara 76-mm. gun, twin Oerlikon 35-mm. gun, two Oerlikon 20-mm. guns, two twin Exocet guided missile launchers and missile fire control system, Ferranti Selenia fire control and Ferranti action information system; two triple anti-submarine torpedo tubes and Plessey MS 26 sonar. Two 2-in. rocket flare launchers are also included, and depth charge rails can be fitted if required. The Mark 8 is designed for a complement of 65.

The Mark 9 corvette is very similar to the Mark 8, the main difference being that the main engines are geared diesels, two to each of two shafts. This machinery arrangement requires a little less length, which results in the overall length of the ship being reduced to 220 feet, and the displacement to 740 tons. Top speed is 29 knots.

Suggested armament for the Mark 9 is the Oto Melara 76-mm. gun and triple Seacat launcher, both controlled by H.S.A. fire control equipment; two single Oerlikon 20-mm. guns, and Bofors 375-mm. twin anti-submarine rocket launcher. Plessey MS 26 sonar is fitted. Accommodation is for a complement of 67.

As is normal in Vosper Thornycroft designs, there is scope for variation in the armament within the overall weight limit of about 75 tons.

As compared with the frigate, the corvette offers the advantages of much reduced first cost and maintenance and manning needs. By taking advantage of the latest developments in weapons and propulsion machinery, Vosper Thornycroft have given these corvettes a very powerful armament and high speeds. Close attention has also been given to sea-keeping qualities, which are supported by the installation of the company's own stabilizer equipment. The new designs, based on Vosper Thornycroft's experience on what is perhaps the widest range of warships developed within a single company anywhere in the world, promise to provide powerful fighting vessels at modest cost.

LOW COST MARINE SPACE LINK STUDY

Unbroken Voice Communications Oceanwide Possible In Future

The Marconi Company has played a leading role as main electronics consultants for a Post Office project to study cost effective satellite communications systems for merchant shipping. After studying a number of alternatives, a wide beam experimental system was installed, during August, 1970, in a trials vessels, the Cunard container ship Atlantic Causeway, on Transatlantic crossings. The system is now working successfully via a satellite to a similarly equipped Post Office shore station in Somerset.

The Company also developed a high-gain antenna, similar to a domestic television receiver aerial, for the system, and this has made it possible to use much equipment which is similar to that used in existing mobile communications. The aerial beam is wide enough for some portion of it to maintain contact with the satellite even when the ship is rolling, and eliminates the need for a costly stabilisation system to counteract the ship's motion.

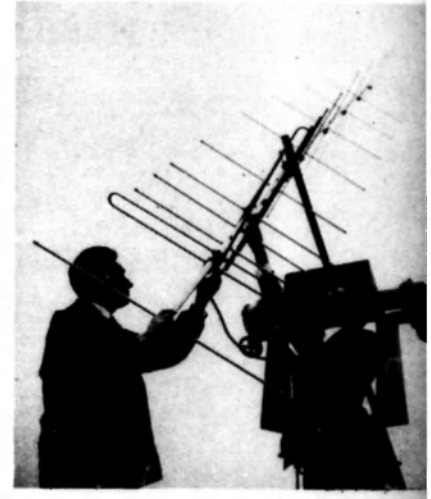
Provided they are cost effective, satellite communications are seen as a solution to the problem of maintaining interference-free short-wave links on transoceanic passages. At present, many vessels are out of voice contact with either shore for long periods in mid-ocean, unless they resort to longer-wave communications which are costly, cumbersome and congested.

TECHNICAL NOTE

The project definition studies for this system had to examine a number of alternative methods of satellite communication to establish the most cost effective for the wide variety of vessels which could usefully employ space links. Microwave dish antenna systems were rejected because of need for expensive, specialised transceiving equipment and antenna stabilisation to counteract the ship rolling effects on the highly directional, narrow beam.

The system decided on, uses a high gain, multi-element crossed 'Yagi' array antenna, developed to eliminate the effects of sea reflection. This has a relatively wide beam (about 30 degrees), so that even with fairly extensive rolling of the ship, some portion of the beam is in contact with the satellite.

The transmission mode for the experiment is narrow band v.h.f./f.m., with approximately 250 Watts terrestrial transmission power. It is providing two transmit and two receive voice channels. Frequencies are 135.6MHz transmit and 149.22MHz receive. The satellite acts as a straightforward repeater at radio frequencies, transponding from the ship's transmission frequency to the shore station's receive frequency and vice versa. The satellite used for the experiment is the N.A.S.A. Applied Technology Satellite A.T.S.3, 22,000 miles above the surface of the Earth.



The Marconi Company has played a leading role for a project to study cost effective satellite communications systems for merchant shipping.

The Company also developed a high-gain antenna, shown here, similar to a domestic television receiver aerial, for the system, and this has made it possible to use much equipment which is similar to that used in existing mobile communications. The aerial beam is wide enough for some portion of it to maintain contact with the satellite even when the ship is rolling, and eliminates the need for a costly stabilisation system to counteract the ship's motion.

UNTO THEIR PORTS WITHOUT PERIL

By George F. Thomson

Lighthouses, Lightships, the training of pilots — these are the responsibilities of the Corporation of Trinity House, London. The corporation's powers were granted in the reign of Queen Elizabeth I, but the twentieth century has brought new problems (like the berthing of giant tankers) and new challenges such as the application of modern technology to the "beacons, marks and signs of the sea".

The Corporation of Trinity House evolved out of a medieval Guild of Mariners which some historians say was founded by Archbishop Stephen Langton.

It is known that the guild functioned as a semi-religious and charitable organisation for the benefit of seamen and their families, and owned a hall and almshouses at Deptford. Following a direct petition to King Henry VIII in 1513 on the grounds that pilotage in the river Thames was being abused by certain inexperienced young men and foreigners calling themselves "lodesmen" or pilots, the guild was granted a charter by the king in 1514.

This charter of incorporation gave Trinity House official recognition with general powers for the safety and progress of shipping and the welfare of seamen and their dependants. By-laws were quickly passed which gave the corporation effective control of pilotage in the Thames, and in 1604, James I conferred on Trinity House the compulsory pilotage of shipping and the exclusive right to license pilots in the river.

The management of the corporation was placed in the hands of a Master, four Wardens and eight assistants known as Brethren. Successive sovereigns have renewed the original charter with or without variation.

Act Of 1565

The connection with seamarks began in the reign of Elizabeth I when by Act of Parliament of 1565 the corporation was given powers to erect "beacons, marks and signs of the sea . . . whereby the dangers may be avoided and escaped and ships the better come into their ports without peril".

It was not until 1836, however, that Trinity House was empowered to control all English lighthouses, due to the previous practice of the crown in issuing patents for lights to private individuals, on payment of a rent. The cost to the corporation, aided by a loan from the state for purchasing these private lights, was 1,200,000 pounds.

Although during its history the corporation has been connected with many sections of maritime affairs, its present day functions, which sprang from these early beginnings, are as a general lighthouse authority for England, Wales, the Channel Isles and Gibraltar; as the principal pilotage authority in the United Kingdom being responsible for London and 40 other Districts; and as an administrator of certain charitable funds.

The management of the day-to-day affairs of Trinity House is carried out by a board of ten active Elder Brethren, one of whom is elected annually as Deputy Master and chairman of the board, and the secretary. The board is assisted by administrative engineering and technical staff.

Men Of High Distinction

The active Elder Brethren, who are men with long experience of command in the Merchant or Royal Navies, are selected from the ranks of the Young Brethren, numbering approximately 300, who are all master mariners or senior naval officers of high professional distinction.

In addition there are a limited number of honorary Elder Brethren, selected by invitation in recognition of their distinguished services. The present head of the service is the Duke of Edinburgh, the Master of the Corporation.

Trinity House has the sole power of erecting lights for general navigation, and the service is responsible for fixed and floating seamarks, visual, audible and electronic aids to navigation. Within its area of jurisdiction there are about 90 lighthouses, 33 light vessels and nearly 700 buoys, over half of which are lighted. Although some local and harbour authorities maintain sea marks within their own port limits, these are regularly inspected by Trinity House and the sanction of the corporation must be obtained before any changes can be made. Similarly, Trinity House has statutory powers over lights maintained by the general lighthouse authorities in Scotland and Ireland.

Trinity House is also responsible for dealing with wrecks round the coast of England and Wales, with the exception of those occuring within local port limits, and wrecks of Her Majesty's Ships.

Financed By "Light Dues"

The present-day powers of Trinity House stem in the main from the Merchant Shipping Act 1894, and the service is financed from light dues. These are levied at every port in the United Kingdom and Eire, and are based on the net registered tonnage of the vessel. Local customs officers act as agents for the collection of dues, which amount annually to about 6,000,000 pounds. The fund, which is administered by the Board of Trade, is used to finance the three general lighthouse authorities.

For the purpose of administration, the coasts of England and Wales are divided into six districts, each under the charge of a superintendent and having its own store or depot and maintenance staff. The chief depot is at Harwich, the others being at Yarmouth, East Cowes, Penzance, Swansea and Holyhead. There is a fleet of nine lighthouse tenders, four of which are based at Harwich and one at each of the other depots. These special vessels, of about 1,500 tons gross, are used for the relief and supply of light vessels and rock lighthouses, servicing of buoys, and the location and marking of wrecks, and for towing light vessels, which have no propulsion machinery of their own, to and from station.

The superintendents are responsible to the board for seeing that their parts of the coast line are at all times properly marked for the benefit of shipping in the area.

At Blackwall, London, is the corporation's main workshop where skilled men are employed in the servicing, maintenance and in some cases the manufacture of service equipment.

Keeping Up With Technology

Although of ancient foundation, Trinity House lives very much in the present and constantly keeps abreast of technological advances with the object of improving seamarks and the conditions of the personnel manning them.

For a number of years past, lighthouses have been electrified where possible, and ageing and obsolescent equipment has been progressively replaced by modern equipment capable of automatic or semi-automatic operation. Much research has been carried out on the development of light sources and fog signals, the xenon arc lamp being one such development. This lamp gives an extremely high intensity light and is capable of flashed operation.

These new developments have enabled expensive, large and often cumbersome optics to be replaced by cheaper compact lenses without any reduction in the power of the light. Sealed beam units like that of a car headlamp, which require no optic, have been installed in a number of lighthouses. These have proved extremely reliable and efficient.

Fog signals too have been greatly improved. At certain rock stations where limited power is available, electric fog signal emitters have been installed, consisting of banks of loudspeaker units which enable the sound to be projected directionally. In other cases, modern, compact and highly efficient compressed air signals have been installed.

A Trinity House Pilot boards an ocean-going vessel

Fog Detectors

With regard to automation, and to effect economies, Trinity House has been experimenting with fog detectors, which are an obvious essential for the complete automation and remote control of lighthouses where fog is a major hazard. It is hoped that in the near future the successful conclusion of this work will make complete automation acceptable to the standard of reliability which Trinity House insists upon and which the mariner has come to expect as part of the service.

Trinity House at present has two major lighthouses which are unmanned and automatic, Orfordness and Tater Du. Both are monitored by the local depots. At Tater Du the lighthouse is all electric, relying on grid mains current with stand-by generators. The lighthouse is fitted with automatic equipment controlled and monitored over land line from the Trinity House depot at Penzance. The light is switched on and off by time switch, but owing to the lack of a suitable fog/signal is operated from the depot on receipt of visibility information from the local coastguard station at Tol Pedn.

At Dungeness in Kent, where one of the most modern lighthouses in the world is situated, the corporation has a research station where new equipment is evaluated and tested for possible service use. A typical example, now in operation, is the solar cell. A bank of these have been installed at the Crossness lighthouse, one of eleven unmanned lights maintained by Trinity

House in the river Thames. The light, which used to be operated by acetylene gas, now relies on sunlight for its power source. Light energy is converted into electrical energy by the solar cells and stored in a battery operating the light. The light is switched on and off by a sensing device, and energy stored during the summer is sufficient to maintain the light during the winter months. So far the equipment has met all expectations, although at present it can only be used for operating low-powered minor lights.

Radar Beacon

A very important step in aiding the mariner was made with the development of the Racon Radar Beacon, installed in a number of lighthouses and light vessels round the coast. Racon equipment causes an enhanced signal to appear on a ship's radar display to indicate the bearing and distance of the lighthouse or light vessel and so help with its positive identification. Trinity House was instrumental in the development of Racon for this purpose, and the first chain of Racons in the world was introduced by the corporation. The present generation Racons are valve-operated, but a new transistorised beacon is at present being tested which it is hoped will give increased reliability, reduced maintenance costs and greatly reduced power consumption. This also applies to second-generation radio beacons — radio position fixing aids which have been available to the mariner for many years.

With regard to light vessels, for so long a trusted and well proved aid to navigation, Trinity House has by far the largest fleet of these craft in the world, the total number on station being 33, with six in reserve. The biggest part of this fleet is concentrated at major and strategic navigational points along the east coast of England in the North Sea. The light vessel has a crew of eleven men, seven of whom are on board at a time. Due to the high cost of maintaining and replacing these vessels, Trinity House has for a considerable number of years been looking for a suitable means of replacing them. Two possibilities have emerged — fixed structures where possible, and large automatic buoys where a floating seamark is essential, especially in areas where the navigational hazard, as in the case of some shoals, is prone to shift.

Reliability The First Aim

Structures may be capable of automatic operation which is impracticable on a light vessel, but it has to be remembered that reliability is the first aim of Trinity House. Breakdowns at sea are not easily rectified due to difficulties of access, especially during adverse weather conditions so common in areas like the North Sea.

An important step forward was taken in 1967, when an order was placed for the construction of a concrete light tower to replace the "Royal Sovereign" light vessel, eight miles (13 kilometres) off Eastbourne in the English Channel. The tower has been constructed on the beach at Newhaven and towed to its position on the edge of the Royal Sovereign shoal. It will have modern living conditions for its crew of three, a powerful light, fog signal and radio beacon. The roof of the cabin has been constructed to enable helicopters to be used in emergencies.

Although the capital cost of the structure is high compared to that of a light vessel, considerable savings are expected in maintenance and manning. The structure will be made as automatic as possible, and a great deal will be learned for future structures.

Automatic Buoys

Where fixed structures are impracticable, Trinity House hopes that the LANBY (Large Automatic Navigational Buoy) will prove suitable for some light vessel stations. An order has already been placed for a prototype buoy, which when complete towards the end of 1969, will replace the Shambles light vessel, six miles off Portland Bill, Dorset. The buoy, of discus shape, will

weigh about 40 tons plus an equal weight of sea water ballast, and will be about 40 feet (12 metres) in diameter. It will be capable of carrying a much more powerful light and fog signal than the largest buoys at present in service. The light will be of the sealed beam type and the fog signal will be electric. It will be powered by diesel generators and be fully automatic with reserve equipment in case of failure. A considerable amount of electronic aids to navigation, including Racon and radio beacon, can be carried, and the machinery will be capable of running for six months or more without attention.

Although the light vessel replacement scheme will obviously be long-term, because of the capital expenditure involved, considerable financial savings will be made. There will be no redundancy however, as natural wastage will be taken into account.

The Busiest Channel

Seemingly less important, buoys play a major role in safeguarding the seas. New buoyage schemes, especially in approaches to ports and harbours and in narrow seaways where shipping is heavily concentrated, are constantly being implemented and maintained by Trinity House. The corporation is responsible for marking routes for specific purposes such as for deep draught vessels within its area of jurisdiction, whenever there is justification or a requirement for such action. Such a case is the two-way traffic separation in the Straits of Dover through which approximately 1,000 ships pass every day. The south-bound lane nearest the English Coast necessitated the laying by Trinity House tender of a number of new buoys, and the movement of the Varne light vessel to a new position. Likewise the French lighthouse service was responsible for changes to seamarks for the north bound lane. This scheme opened in 1967 and, being the first of its kind, has greatly reduced the number of collisions in one of the most heavily congested seaways in the world.

Likewise, in co-operation with the Port of London Authority, Trinity House was responsible for the provision and laying of buoys for a new deep-water approach, opened in 1967, to the Port of London. This need arose from the increasing size and draught of modern oil tankers and bulk carriers, a situation made worse by the instability of other channels in the Thames estuary. The scheme was completed within nine months, and involved the establishment initially of 23 new lighted buoy stations and the discontinuance, movement and re-naming of several others. Throughout the entire operation the closest possible liaison existed between Trinity House and the port authority, and thanks to this co-operation a complicated, difficult and challenging job was carried out satisfactorily.

Bells And Whistles

Trinity House has maintained unlighted buoys for more than 300 years, but it was not until 1880 that a lighted buoy was first used. Today all buoys in the service are of mild steel or wrought iron and vary in diameter from 5 to 12 feet and weigh anything from three to twelve tons, without moorings. Lighted buoys burn dissolved acetylene, and in addition to the light, some buoys carry sound devices such as bells, whistles and in some cases small electric fog signals. The majority of buoys today are fitted with radar reflectors to make them more readily identifiable on ships' radar.

During the twentieth century, the question of uniformity in buoyage arose, as rules of the road are necessary to avoid collision in confined waters and channels. International agreement, under the auspices of the League of Nations, was reached in 1936 and rules for the regulation of buoyage were drawn up and published in 1937. Two systems of marking are permitted, based on specific shape, colour and light, known as the lateral and cardinal systems. The lateral provides for the buoys to be laid out in linear formation following the direction of the main stream of flood, and the cardinal for placing buoys in relation to the four cardinal compass points. In this country, because of the natural tidal stream, the lateral system only is used.

International Discussions

On the international scene, Trinity House plays an active part in the International Association of Light-house Authorities which has a permanent secretariat in Paris to organise five-yearly international conferences and whose aim is to foster technical co-operation between member countries in every way possible.

Trinity House is at present engaged on a feasibility study on the use of helicopters for the relief of keepers and supply of stores to offshore lighthouses, which may have far-reaching effects. This scheme, if acceptable, may show considerable savings in time and money.

Pilots Self-Employed

Trinity House is the pilotage authority for London and 40 other districts including Southampton, Milford Haven and Falmouth. The corporation licenses but does not employ the pilots, who are self-employed. Control of the service is carried out under the terms of the Pilotage Act 1913 and by by-laws made under the terms and provisions of the act. The service is self-supporting, its income being derived from a levy on pilots' earnings, dues paid by vessels for shipping and landing pilots, and from licenee fees.

There are about 800 Trinity House pilots of whom about 500 are in the London district. To qualify, a London pilot must be British, physically fit, possess a foreign-going master mariner's certificate, have eight years' experience as a watch-keeping officer and be under the age of 35. Having been interviewed and selected, the candidate pilot has, at his own expense, to accompany fully qualified pilots on their trips for a period of three to six months depending on their previous experience of the area. After completing his qualifying trips, the candidate is examined by an Elder Brother of Trinity House. If satisfactory he is issued with his licence as a third class pilot. The licence is reviewed annually after the pilot has satisfied an Elder Brother that he is conversant with changes in his district, and that his eyesight and physical fitness remain good.

The Training Period

For the first three years of service, London pilots are restricted to piloting ships drawing less than 14 feet. After this period the pilot takes another examination and if successful gains a second class pilot's licence for ships up to 12,500 tons. Finally, after one more year, he takes his first class certificate which enables him to pilot ships of any size.

Normally pilots work on a roster system and all London pilots pool their earnings.

The control of London pilotage district is in the hands of a committee comprising Trinity House repre-sentatives, shipowners and pilots.

There are four main pilot stations: Dover and Folkestone, Harwich,

Sheerness and Gravesend, and five main classes of pilots: River Thames-Gravesend to London Bridge and vice versa; Channel-Gravesend to the Sunk Cutter or to Folkestone; Cinque Ports-Folkestone to Gravesend; North Channel-Sunk Cutter to Gravesend or Cork to Harwich and Felixstowe; and River Medway-Sheerness to Rochester Bridge and vice versa and to Sunk Cutter and Folkestone.

Sea pilots work in only one direction; river pilots work in both.

Sub-Commissioners

In districts away from London, the powers and duties of Trinity House are exercised and performed through committees. The sub-commissioners, as the members are known, are largely men of nautical experience or representing local shipowners or agents. The sub-commissioners, who are not paid with the exception of fees from the granting of licences and pilotage certificates, examine the pilots and conduct enquiries into casualties or disciplinary offences.

The corporation owns a fleet of pilot cutters, fast launches and ancillary craft operating in the London, Isle of Wight and Falmouth districts. As in the lighthouse service, Trinity House has made, and is still in the process of making, major changes in the running of the pilotage service, which it is hoped, if not perhaps leading to a reducation in costs, will at least enable them to be held stable for some time.

One important development is the replacement of the pilot cruising cutters, where possible, by fast shore-based launches. Cutters are expensive to maintain and build, and pilots often spend many wasted hours on board the cutter waiting for ships requiring their services.

The first replacement scheme took place in 1957 when the cutter stationed at the Needles entrance to Southampton was replaced by fast launches based at Totland, Isle of Wight. This scheme has not only proved to be the prototype of similar Trinity House schemes, but has also been generally adopted by other pilotage authorities both in Britain and abroad.

Communications Centre

To date fast launches have been introduced at Folkestone, replacing the Dungeness Cutter for the south-western approach to the London pilotage district, and at Harwich to facilitate the movement of ships bound to and from the Harwich and Felixstowe complex of ports. In the latter case the sunk cruising cutter at the northern approach to the London pilotage district, will still be used for ships bound to and from London. At Folkestone, a new communications centre and pilots' look-out is being built on shore, while at Harwich a disused lighthouse is being converted for the same purpose.

The increasing size of oil tankers and bulk carriers has not produced any insurmountable problems for the Trinity House pilotage service.

The handling characteristics in the case of such vessels are as good if not better than smaller ships, although obviously manoeuvrability with regard to stopping distances, turning circle and so on need greater consideration.

Pilots are fully aware of the problems associated with the navigation of these large vessels, especially the vulnerability of the cargo. Nevertheless problems do occasionally arise when navigating in narrow channels where the lack of room for manoeuvre is greatly reduced by the depth and width of the channel. There is very little space for a ship to deviate from the channel should it be necessary to avoid another ship by the "rule of the road". Berthing, too, can present a problem especially where wharfs and jetties have been constructed with smaller ships in mind.

To overcome these various problems only experienced senior Trinity House pilots are used on vessels over a certain size. In some cases, two pilots may be employed.

Charities and Bequests

As a charitable body, Trinity House maintains homes for officers of the merchant services and their dependants, at Walmer in Kent. Attached to the homes is a hospital specially equipped to deal with the needs of elderly people.

In addition, Trinity House is responsible for the administration of a number of legacies left by former Elder Brethren and other benefactors of the corporation.

Whatever the future holds, Trinity House will strive to uphold the spirit and tradition of the Charter of Henry VIII, "the safety and wellbeing of the mariner".

CONVERSION TABLE METRIC/IMPERIAL

METRES TO FATHOMS

Metres	Inches	Feet	Fathoms
1 =	39.370	3.281	0.547
2 =	78.740	6.562	1.094
3 =	118.110	9.843	1.640
4 =	157.480	13.123	2.187
5 =	196.850	16.404	2.734
6 =	236.220	19.685	3.281
7 =	275.590	22.966	3.828
8 =	314.960	26.247	4.374
9 =	354.330	29.528	4.921
10 =	393.700	32.808	5.468
11 =	433.070	36.089	6.015
12 =	472.440	39.370	6.562
13 =	511.810	42.651	7.108
14 =	551.180	45.932	7.655
15 =	590.550	49.213	8.202
16 =	629.920	52.493	8.749
17 =	669.290	55.774	9.296
18 =	708.660	59.055	9.843
19 =	748.030	62.336	10.389
20 =	787.400	65.617	10.936
21 =	826.770	68.898	11.483
22 =	866.140	72.178	12.030
23 =	905.510	75.459	12.577
24 =	944.880	78.740	13.123
25 =	984.250	82.021	13.670
26 =	1023.620	85.302	14.217
27 =	1062.990	88.583	14.764
28 =	1102.360	91.864	15.311
29 =	1141.730	95.144	15.857
30 =	1181.100	98.425	16.404

FATHOMS TO METRES

Fathoms	Metres
1 =	1.829
1.5 =	2.743
2 =	3.658
2.5 =	4.572
3 =	5.486
3.5 =	6.401
4 =	7.315
4.5 =	8.230
5 =	9.144
5.5 =	10.058
6 =	10.973
6.5 =	11.887
7 =	12.802
7.5 =	13.716
8 =	14.630
8.5 =	15.545
9 =	16.459
9.5 =	17.374
10 =	18.288
10.5 =	19.202
11 =	20.117
11.5 =	21.031
12 =	21.946
12.5 =	22.860
13 =	23.774
13.5 =	24.689
14 =	25.603
14.5 =	26.518
15 =	27.432
15.5 =	28.346

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Periscope on Australia

by Grommet

OTOMAT MISSILE

Australia may buy the French near-supersonic Otomat sea-to-sea missile, an official for the manufacturing company, Engins Matra, stated recently.

The official named Australia, South Africa, Pakistan and Brazil as among countries interested in the Otomat, which Matra describes as a "sure-hit" missile.

Matra recently clinched an $8.9 million contract for 50 Otomats for the Italian Navy.

The near-supersonic Otomat has a range of 37 to 50 miles, but its fuel tank has been designed for a range exceeding 75 miles — far beyond the conventional radar horizon of a ship.

The British Navy is negotiating the purchase of about 300 Exocet MM-38 missiles — a rival of the Otomat — which have been developed by the French Aerospatiale Company.

NEW F.O.C.A.F.

Captains of R.A.N. warships in port in Sydney last April, paraded on board H.M.A.S. **STALWART** to meet the new Flag Officer Commanding the Australian Fleet, Rear Admiral W. J. Dovers (centre). He succeeds Rear Admiral H. D. Stevenson (left) who will become Second Naval Member of the Naval Board and Chief of Naval Personnel. In this picture Captains are, from left, Captain G. J. Willis **(MELBOURNE)**, Captain H. E. Bailey **(SUPPLY)**, Captain I. M. Burnside **(PERTH)**, Captain J. A. Robertson **(HOBART)**, Commander R. W. Burnett **(DERWENT)**, Commander I. W. Knox **(TORRENS)**, Commander D. P. Weil **(QUEENBOROUGH)**, Lieutenant Commander I. D. Roberts **(OXLEY)** and Lieutenant Commander A. V. R. Horne **(KIMBLA)**.

RELICS ABOARD DIAMANTINA

The R.A.N.'s oceanographic research ship, H.M.A.S. **Diamantina**, arrived in Fremantle last April with valuable relics recovered from the Dutch ship **Batavia** wrecked off the West Australian coast almost 350 years ago.

The relics included a 2½ ton bronze cannon; two, one ton iron cannons; a one ton anchor, cannon balls, an assortment of pottery, ballast bricks and other artefacts.

The **Batavia**, a 140 ft. Dutch East Indian ship, was wrecked during the night of 4 June, 1629, on Morning Reef in the Wallabi Group of the Albrolhos Islands, about 46 miles from Geraldton.

THAI ARMED FORCES DEFENCE COLLEGE

A party of 60 students and staff of the Thai Armed Forces Defence College, led by the commandant, Air Marshal Chumsai Ekachant, visited Canberra, Sydney and Perth for an eight day period last April.

Students at the College are senior officers of the Royal Thai Armed Forces and their visit is aimed at giving them a first-hand knowledge of conditions in Australia to assist them with their general studies at the College.

VISIT BY UNITED STATES NATIONAL WAR COLLEGE

A 38 member party from the U.S. National War College visited Australia from 20-23 April, 1971, as part of a tour of the Asian and Pacific region.

The visitors, led by Colonel Vaughan Miller, U.S.A.F., were senior officers from the Departments of State and Defence, Army, Navy, Air Force and Civilian Agencies of Government.

The National War College was established in 1946. It is a top-level inter-service college for senior military officers and civilian career officials of the United States. The

PERISCOPE ON AUSTRALIA

College functions under supervision of the American Joint Chiefs of Staff and is the senior service school in the field of politico-military affairs. Other groups from the college are visiting countries in the Middle East, Africa and Latin America. These visits are an integral part of the College curriculum and permit first-hand observation by the students of conditions in various parts of the world in preparation for their future duties. On return to the National War College, each of the groups report to the College as a whole on their tour.

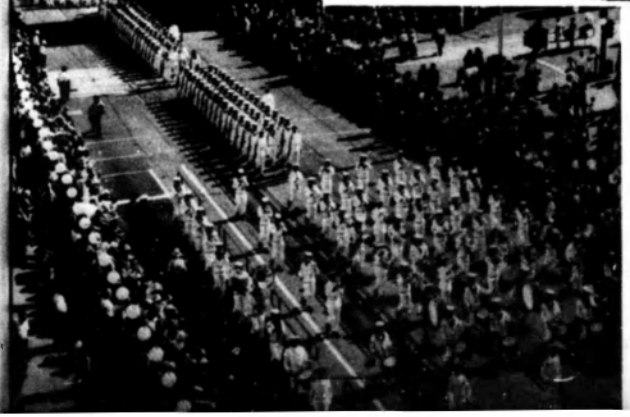
SHIPS FOR DISPOSAL

The R.A.N. is to dispose of four ships from the Reserve Fleet — H.M.A. Ships **Tobruk**, **Quiberon**, **Barcoo** and **Kara Kara**, which are berthed at the Naval dolphins in Athol Bight, Sydney Harbour.

After various pieces of useful equipment have been removed, the Department of Supply will call tenders for the purchase of the vessels.

NEW NURSING PRINCIPAL

Matron Maude Jones (left), Principal Matron of the Royal Australian Navy Nursing Service, who retired recently, chats with her successor Superintending Sister Patricia Vines. Superintending Sister Vines has been Matron of Balmoral Hospital at H.M.A.S. **Penguin**, Sydney.



FREEDOM OF THE CITY OF MELBOURNE

Last March, almost 1,000 officers, sailors and Wrans of the Royal Australian Navy marched down Swanston Street, Melbourne, after receiving on behalf of the Navy the freedom of entry to the city. The parade received the traditional honour from the Lord Mayor, Councillor E. W. Best. After being challenged by a city marshal, the parade was allowed to march through Melbourne streets "with swords drawn, bayonets fixed, drums beating, bands playing and colours flying".

PERISCOPE ON AUSTRALIA

SEAGOING OPTIMIST

Leading Seaman Lloyd Brown, equipped with golf clubs, went to war last March aboard the guided missile destroyer, H.M.A.S. **Brisbane.** His shipmates were then looking forward to discovering where he intended practising his putting on the equipment-packed destroyer. H.M.A.S. **Brisbane** sailed to relieve H.M.A.S. **Perth** on the gunline off South Vietnam.

— OUR COVER —

Lynx Helicopter Begins Flight Development Programme

The Lynx — the third helicopter to be developed under the Anglo/French collaborative programme which started in 1967 — has begun its flight development programme at Westland Helicopters Ltd. in the west of England. A high-performance helicopter with a maximum all up weight of 8,000 pounds, it is powered by two Rolls-Royce BS 360 nine hundred shaft horse power engines, giving it a cruising speed of 185 miles per hour and a range of 440 nautical miles.

The first new British-designed helicopter for many years, it has many technical advances embodied in a deceptively conventional looking frame. Notable among these are the semi-rigid or hingeless rotor head, the simplicity of which contrasts strinkingly with a conventional head, and the 'conformal' gear train which, size for size, can transmit twice as much power as conventional gearing.

Orders expected for the Lynx include 150 for the British Army, 80 for the French Navy and 100 for the Royal Navy which, when added to other expected military sales, could amount to business worth as much as 150 million pounds. Its performance, twin-engined safety and all-weather capability could also attract the civil user, and sales, as a small, fast inter-city VTOL transport and executive aircraft, could put this figure even higher.

SOUNDS THEY CAN SEE

A new device to help deaf children to speak enables the human voice to be depicted on a screen as a "graph signal". Basic speech sounds can be photographed and children, by using a microphone, try duplicating them — and can see the result . . .

by Jonathan Eastland

"Voice Signature" is an electronic device to help deaf children with their speech. It was assembled by young officers at Her Majesty's Ship COLLINGWOOD, the Royal Navy's Weapon and Electrical Engineering School in southern England. Here Lieutenant R. R. Rundle shows six year old Timothy Knight how it works.

Deaf youngsters are learning to speak, thanks to an electronic visual aid developed by Britain's Royal Navy.

Penhale Infants' School at Portsmouth, southern England, has a special unit for deaf children. Some 7 per cent of the school's pupils are deaf and their ages range from 3-11 years.

Two years ago, the school asked a group of young officers at the nearby Royal Naval Weapon and Electrical Engineering School, Her Majesty's Ship Collingwood, to help by developing some special aids for the deaf.

TWO REQUIREMENTS

There were two requirements for the project. The first was that any machine or instrument developed must give an indication of the volume of sound produced by the operator. Secondly, it must give an indication to the child when the sound produced was the right one.

The Navy came up with the "Voice Signature" which has proved a great success. Basically, the instrument is comprised of an oscilloscope, built into a circuit which allows human sounds to be depicted in the form of a "graph signal" on the oscilloscope screen.

The first requirement was met fairly easily by adapting a simple voltmeter, but the second posed more of a problem to the young men involved with the project. Not only did they do the work in their spare time but they spent various periods away from Collingwood.

SIX MONTHS' WORK

The prototype was produced after six months of this necessarily intermittent work by Lieutenant P. R. Rundle and Lieutenant R. J. Wright. Teachers from Penhale School then demonstrated some 40 basic consonant and vowel sounds. These were photographed from the screen and the pictures mounted in ordinary 2x2 in. slide-holders next to the screen of the "Voice Signature". The child is encouraged to produce sounds into the microphone which, when depicted on the screen, match the photograph.

Apart from some initial shyness from some of the younger children, the project has proved a success. The only other problem, not a major one, was to encourage the children to concentrate on the oscilloscope screen instead of on the lips of the tutor to which they are accustomed.

Lip reading is taught to all deaf children at the school — although the majority are able to understand what is being said and can communicate back, there are only one or two children who have never been able to utter a sound.

Patrick, for instance, is four and until now has not responded to any treatment. For him, the "Voice Signature" has opened up a whole new world. Now he is not only able to make sounds and match them to the photographs, but can even utter a few sentences.

Part of the secret, of course, is that the children can see what they are doing, whereas before, they had to rely totally on lip-reading. Undoubtedly, the children have benefited from the use of both the original machine and the Mark II version which has followed the prototype. Older pupils are able to reproduce sounds more or less exactly and younger children have shown a considerably improved interest in learning.

SOUNDS THEY CAN SEE

ALL SOUNDS — ALL LANGUAGES

The headmistress of the school, Miss Margaret Willey, thinks that they could possibly achieve even better results by photographing basic sounds made by children instead of those of adults. "Grown-ups tend to be too perfect", she said.

But, this is something which can be easily tried out for any number of sounds can be made and photographed. And of course the machine could be adapted for use with any language.

The instrument is easily portable and a comprehensive handbook has been prepared so that any competent electrical engineer can make repairs or service the machine.

The Royal Navy is unlikely to produce any more "Voice Signatures". The development of the instrument was something of an exercise for those involved and the young officers at Collingwood who did the job will disperse when their training there is finished.

It is hoped that civilian companies will take over — indeed, one small electronics firm in Britain has already come near to producing a similar circuit. The device would cost about 40 pounds ($85) to buy in Britain. By using solid state circuitry it can be made more easily portable.

Meanwhile, the "Voice Signature" instruments in use at Penhale Infants' School have practically taken over from human teachers, and the young toddlers especially have been quick to catch on to its possibilities.

When several photographers tried to operate one of the machines to be used by four-year-old Margaret she soon discovered it was not plugged in. The rocket she gave them was most understandable!

SUBSCRIPTION FORM

To "The Navy",
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I enclose $2.00 being "subscription to "The Navy" magazine for 1½ years (refer notes below).

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Please place a tick in the square if a receipt is required ☐
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CONTRIBUTIONS INVITED

The editor invites persons to submit articles, photographs and drawings (black ink) for inclusion in the magazine, but regrets that no payment can be made for contributions submitted. Contributions should be addressed: The Editor, The "Navy", Box C178, Clarence Street Post Office, Sydney, N.S.W., 2000, Australia.

The Editor does not hold himself responsible for manuscripts, photographs, drawings, etc., but will be made to return those with which a stamped and addressed envelope is enclosed.

"The Civilian Arm of the Navy"

The principal objective of the Navy League of Australia is to stress the vital importance of Sea Power to the Commonwealth of Nations and the important role played by the Royal Australian Navy.

The League, in conjunction with the Commonwealth Naval Board, administers the Australian Sea Cadet Corps, by providing finance and technical sea training for boys who intend to serve in the Naval or Merchant Services, also to those sea-minded boys, who do not intend to follow a sea career, but who given this knowledge will form a valuable reserve for the Naval Service.

We invite you to swell our ranks and so keep up to date with Maritime Affairs to help to build an ever-increasing weight of informed public opinion. The Navy League will then become widely known and exercise an important influence in the life of the Australian Nation.

The League consists of Fellows and Associates. All British subjects who support the objectives of the League are eligible for membership. Members receive copies of the League's magazine "The Navy".

DIVISIONS

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Tasmania –
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THE NAVY LEAGUE OF AUSTRALIA
Application for Membership

To The Secretary,
The Navy League of Australia.

(.....Division).

Sir,

I am desirous of becoming a Member of the Navy League of Australia with whose objects I am in sympathy.

Name (Mr.) (Mrs) (Miss) (Rank) .....

Please Print Clearly

Street ..... Suburb .....

State ..... Post Code .....

Signature ..... Date .....

Enclosed is a remittance for $4.20 being my first annual subscription

AFTER COMPLETION, THIS FORM SHOULD BE DISPATCHED TO YOUR DIVISIONAL SECRETARY — NOTE LIST OF ADDRESSES ABOVE.

A Bill of considerable significance to the Royal Australian Navy, The Navy League of Australia and the Australian Sea Cadet Corps, was passed by the Commonwealth Parliament during March of this year.

NAVAL DEFENCE ACT, 1971

The principal objective of the legislation was to provide for the establishment of Naval Reserve Cadets, and in order that readers might be better acquainted with the ramifications of the measure, extracts from the speeches made by the Minister for the Navy and Mr. Barnard (Opposition) in the House of Representatives, have been collated hereunder from the Hansard report of the second reading debate —

Mr. Killen, Minister for the Navy:

"This Bill seeks to amend the Naval Defence Act in two respects. Firstly it seeks to repeal the existing Part V of the Naval Defence Act which covers cadets.

The present Part V of the Naval Defence Act covers naval cadets. The two relevant sections of the Act are sections 38 and 39. Section 38 of the Act deals with naval reserve cadets and it has done so for many years. Section 39 of the Act deals with a body known as the Australian Sea Cadet Corps. This Bill seeks to repeal those two sections which constitute Part V of the present Act. The second thing this Bill seeks to do is to put into effect two completely new sections of the Act. I think this is a splendid Irishman's approach to the problem; it repeals the part and then puts it back. But it is one of the quaint quirks of history that for more than 50 years this country has had two bodies of sea cadets — an extraordinary thing. Both bodies, of course, have shared in maintaining the same essential naval traditions. Both bodies have sought to encourage the same interest in the Royal Australian Navy, those who serve in it and those who have served in it.

Strangely enough both bodies had completely different origins. The origin of the Royal Australian Naval Reserve cadets goes back to 1903 and the introduction of the first Defence Act in that year.

The 1903 Defence Act dealt with military cadets and with naval cadets. The thought of having air cadets was not present.

The next change to the cadet structure occurred in 1909 when the Defence Act was altered again. It made what, with respect, I would describe as superficial alterations to the provisions dealing with cadets. In the following year, 1910, occurred what in terms of my existence today, was a great event. It was the introduction of the first Naval Defence Act by the then acting Prime Minister and Attorney-General, William Morris Hughes.

It is very difficult to find any genuine novelty of experience or, indeed, novelty of attitude. This is apparent when one reads the speech of William Morris Hughes in 1910 when he introduced the first Naval Defence Act. He said, in effect, that because of changing circumstances in the world, nine-tenths of the great British Fleet had to be withdrawn to home waters in the United Kingdom. Some people say that the British policy of withdrawing forces from east of Suez is something sudden and new, but in view of what was said in 1910 I wonder whether that is the case.

The Defence Act applied to cadets and it has continued to apply to cadets ever since, although it has applied to a dwindling body of young men. From 1903 until 1929 there was universal training. Interestingly enough, in 1929, the statutory provisions relating to universal training were repealed by a proclamation issued by the Governor-General. This may seem rather strange, but that was the case. The statutory provisions of an Act were repealed by way of proclamation. Whether or not that was valid is a dry argument. However, it is interesting to reflect that that is the way in which it happened. In point of fact, for more than 2 generations the Naval Defence Act and the Defence Act covered cadets. Then in the 1920s there came into being in Australia a small, voluntary body of people known as the 'Navy League'.

The League has comprised a magnificent body of people who have sought no gain or acknowledgement. Of all the disciplines in this world the discipline which is not practised frequently enough it that of gratitude. Very few of us know how to say thank you, particularly to voluntary bodies. The Navy League in Australia is made up of voluntary people who have given of their time unsparingly. They have made a singular contribution in a very direct sense to the defence quality of this country. The Navy League has sought, as did those who were responsible for administering the Defence Act and the Naval Defence Act, to stimulate, encourage and arouse the interest of cadets in naval matters. As at the beginning of this month there were just on 2,000 members of the Australian Sea Cadet Corps in Australia, all of them significantly maintained by the Navy League. It has become a very real burden to these people to maintain the cadets. They have been charged with the responsibility of providing accommodation for the cadets.

After the establishment of the Navy League, the Naval Board formed an arrangement with the Navy League and sought to assist it, but it was not until the 1950s that there was created a central body with which the Naval Board could, to put it in homely language, do business. In 1952 the existence of the Navy League in Australia was recognised by statute. This was not long ago. This recognition is contained in section 39 of the Naval Defence Act. Under that provision the Naval Board is charged with doing a variety of things. Also under that section the Navy League is

similarly charged with doing a variety of things. I would, with infinite respect to both the Naval Board and the Navy League, say that there cannot be found a clear definite line between one area of responsibility and the other. This Bill proposes to thrust upon the Naval Board — which, of course, means upon Parliament and upon the country — the responsibility of maintaining the existence of naval cadets. In Australia today there are, I think, but 3 schools which have Royal Australian Naval Reserve Cadets. These cadets number 116 or 120 and the remainder of the cadets are attached to the Australian Sea Cadet Corps. The central purpose of the Bill is to fuse naval cadets into one body and, to that extent, it puts naval cadets on a comparable basis with Army cadets and Air Force cadets.

The people associated with the Navy League in Australia have been and remain a splendid body of people. I am sure that this would be the view of every member of the Parliament who has had the opportunity of any association or link with the Navy League. As I have said, we are not always as frequent as we should be in giving thanks. It is easy to be cynical but there is much in this country and in the world for which one should be grateful. The tremendous sense of enterprise and good-will which this body of people has shown in Australia to young men is something that I should like to acknowledge in the most complete sense. I have had the opportunity of meeting them in virtually every State. These people have gone out of their way to ensure that young boys who are interested in ships and in the Navy are given every encouragement. Some members of the Navy League have had links with the Navy. Many of them have commanded superb records in serving this country. Some of them have not served with the Royal Australian Navy but, nevertheless, they have had an insistent interest in naval matters. I would not like any member of the House, and in particular any member who may have been associated with the Navy League, to get the view that this is the end of the road for the Navy League. On the contrary, the Naval Board looks with a sense of anxiety and hope to the Navy League to continue to sustain this interest in naval matters. The young men who will serve in the Naval Reserve Cadets from now on will be assured of 2 things. They will be assured of the abiding interest of the Naval Board and of the country in their existence, and I believe they will also be tremendously sustained by the genuine and most warm-hearted interest shown by those who have been associated with the Navy League. I commend the Bill to the House."

Mr. Barnard (Deputy Leader of the Opposition):

"The Opposition supports this Bill.

Briefly the position is that an organisation known as the Australian Sea Cadet Corps has existed for more than 40 years under what could be described as the leadership of the Navy League, which is a voluntary body. The Corps was formed to create and foster interest in naval and maritime life. Although it was sponsored by an organisation which is dedicated to the Navy, its activities were not confined exclusively to the Navy. For this reason a liaison was established with the Australian National Line in the functioning of the Sea Cadet Corps. The intention was to stimulate the interest of youth in the whole range of maritime activity. This was a worthy objective in a country such as Australia, which has a traditional reliance on maritime commerce.

The sea cadet organisation which was sponsored by the Navy League was given recognition in principle, as the Minister pointed out, by the Naval Board in 1949. In 1952 the Naval Defence Act was amended so that the Board could give direct assistance to the Sea Cadet Corps. Regulations were made in 1954 to enable the Board to give this assistance. This meant that the Navy could give a certain measure of practical assistance to the Sea Cadet Corps. This assistance comprised the appointment of officers and instructors, training and administrative assistance, the provision of uniforms, stores and equipment and the payment of a capitation fee. The Navy League remained responsible for accommodation and facilities not provided by the Navy, such as recreational equipment. It also remained responsible for the day to day administration of the Corps.

I have on a number of occasions in the past offered criticisms in this House of this aspect of the administration of the Sea Cadet Corps. This Bill will give expression to my belief that the Sea Cadet Corps should be placed on the same basis as the Army and Air Force cadet corps. I have expressed this opinion in the House on a number occasions. These changes took some of the burden off the Navy League, but they did not provide the central administration for the Corps. The administration was left to the State divisions of the Navy League, which made national co-ordination difficult. There were also difficulties for the League in providing suitable accommodation and facilities for the units which comprise the Corps. Capital spending on accommodation was a heavy burden on the League's resources. Without simple direction the Sea Cadet Corps was not a corps in the sense of being an organised body. It was organised on State lines, which tended to restrict the outlook of individual units to State borders. The Navy League and the Navy recognised that the basic weakness of the structure was the division of responsibility between them. The amendments before the House are designed to remove this division of responsibility and to transfer sole authority for administration of the Sea Cadet Corps to the Naval Board. The Navy also takes over responsibility for accommodation. This also means that the taxpayer assumes full responsibility for maintaining the existence of sea cadets. The Minister did not give an estimate of the extra charge on the Budget of this transfer of authority. There is no information in the appropriations on the annual cost of the Sea Cadet Corps to the Navy. The only figures I have been able to find are sadly out of date. According to these figures the Navy spent about $100,000 in 1964-65 on approximately 2,500 sea cadets — about 2,000. Allowing for increased contribution amounted to $28 a head, giving total spending of $68 a

head — about $170,000 a year in all. The Minister said that the present strength of the Cadet Corps was about 2000. Allowing for increased costs I doubt that the annual cost to the Treasury would be more than $170,000 a year; it may be even less. Perhaps the Minister could outline financial details when he winds up the debate. Whatever the total cost, it seems to me to be reasonable and acceptable.

The Minister pointed out that the sea cadet structure in Australia is mainly comprised of open units, that is, units which are open to all volunteers and are not confined to members of a school or other institution. There has been some criticism of the Army cadet system in recent years because too much of the assistance provided by the Commonwealth flows to wealthier schools which can maintain big units. The traditional system where even a small secondary school could sustain a modest cadet unit seems to have disappeared, perhaps because of basic changes in the education structure of the States in recent years.

The Opposition believes that ultimately we must attract in this country a completely voluntary system of defence forces. It believes also that this can be attained. For this reason, the cadet corps, whether of the Navy, the Army or the Air Force, is of great importance. The numbers in these corps should not be allowed to diminish; indeed, they should be encouraged. Therefore, if there is some difficulty in providing cadet corps in the smaller schools of the State school system which lack the facilities that are automatically available in some of the larger private schools, I think that the situation should be remedied. I put this forward as a reasonable suggestion to both the Minister for the Navy (Mr. Killen) and the Minister for the Army (Mr. Peacock).

I return to the matter before the House. The criticism of the Army cadet system to which I have referred cannot be levelled at the Sea Cadet Corps. The Minister said there were 3 schools with Royal Australian Naval Reserve cadet units. These units numbered 116 or 120 cadets, compared with the 1,900 or so cadets in the Australian Sea Cadet Corps. There are more than 30 open units, and 3 closed units. The information I have is not up to date but I understand the 3 school units are at the Macquarie High School in Sydney, the Geelong Grammar School, and the Brisbane Church of England Grammar School. If this information is not up to date, I hope the Minister will correct it. If correct, it would not indicate to me an excessive allocation of resources to wealthier schools at the expense of open units which all young men with an interest in maritime life can join.

One aspect of this legislation which should be clarified is the future role of the Navy League in the work of the Sea Cadet Corps. I understand this is the subject of discussion between the Minister and the League at the moment. It is appropriate that a voluntary body which has put such a huge effort in both cash and labour into forming and administering sea cadet units should be assured of a significant role in the continued operation of the Corps, even though the primary burden has been transferred to the Naval Board. It has been suggested that the League could still be able to provide amenities additional to those supplied by the Navy. I hope that the Minister looks at this side of the shift of responsibility and writes into the regulations a significant and clearly defined role for the Navy League which has made a remarkable contribution to naval and maritime education in this country.

I have learned from discussions that I have had with people who are associated with the Navy League that the Minister himself has had discussions with them. He therefore, as he said in his second reading speech, is in a position to know and appreciate the magnificent contribution that this organisation has made — I have mentioned this already to the House — on a completely voluntary basis over a very long period. Indeed one can say without a fear of contradiction that had it not been for the Navy League and its activities, and the voluntary work that it has done over a lengthy period, it is very doubtful whether the Navy Sea Cadet Corps would still be in existence. Certainly the Government has moved from time to time, as I have indicated to the House, to make some improvements in the structure of the organisation, but I think even since 1954 when the last major amendments were made to the Act the greater responsibility has fallen upon the Navy League. I appeal to the Minister to give every consideration to the points that I have made in respect to the future of the Navy League to ensure that its activities are not only accepted as a responsibility at Government level but indeed are encouraged by the Government."

Mr. Killen (in reply):

"I would like to assure my honourable friend the Deputy Leader of the Opposition (Mr. Barnard) that I did not take the slightest objection to what he described as being a criticism. Indeed, if it is to represent an impeachment I would regard it as the most gentle and certainly the most generous impeachment ever made of any member of this House. I would like to thank my honourable and gallant friend very much indeed for his kind words. I did not weary the House in my second reading speech with minutiae. I hope that the Deputy Leader of the Opposition will not think it awry when I say that I believe that a host of figures and details in second reading speeches can make the speeches somewhat wearying. I do not want to anaesthetise the House in any way. But I would like to assure the honourable gentleman that the question asked by the honourable member for Brisbane (Mr. Cross) can and will be answered speedily. I think this would be an indication of the fact that the information is readily available.

The honourable gentleman particularly asked me whether I could give an indication of what the amalgamation will represent in terms of change. I am informed that the cost of the amalgamation for the next financial year will be of the order of $46,000 in terms of allowances and pay. It is not known what will be involved in terms of expenditure for buildings and so forth. I am further informed in regard to recruiting that in the period for which statistics have been kept 6 to 8 per cent of the total number of cadets who have been through the Naval Reserve Cadets and the Australian Sea Cadets Corps

NAVAL DEFENCE ACT

have become eligible to join the Royal Australian Navy. I suppose one may be at liberty to hold some disquiet that the figures are not greater. However, I suppose it is intelligible that many young boys find an interest in the sea and join the Sea Cadets at an early age, and that their interest is not sustained in later life for a variety of reasons.

The other point raised by the honourable gentleman and also by the honourable and gallant member for Isaacs (Mr. Hamer) involves the future role of the Navy League. I should like both honourable gentlemen to understand that the Naval Board will be seeking anxiously to try to find a real and vital role for the Navy League. I believe that I indicated in my second reading speech that the Australian community, in its corporate sense, is superbly served by voluntary organisations. I dip my lid to the likes of the Navy League and the superb work that these people have done. It is not going to be easy to decide the relationship between the League and the Navy and I would excuse myself from trying to hammer out some clinic style formula as to what the relationship will be. I suppose this will provide an ample opportunity for the pragmatism of politics to assert itself and that pragmatism will be asserted. There is a tremendous amount of goodwill in the Navy League towards the work of the Royal Australian Navy and there is a tremendous amount of admiration held by the R.A.N. for those who have served in the Navy League."

PENGUIN

A Norwegian developed surface-ship guided missile system

Introduction

The Norwegian naval concept and ship-building plan of 1960 marks the transition of the Royal Norwegian Navy from a mobilization navy to a standing navy consisting of a relatively large number of small units in operative service also in peacetime. The Royal Norwegian Navy has put emphasis on making these small units as powerful as possible, and saw the need for a missile-system for this purpose at an early stage. Consequently the development of the PENGUIN-system was started in the beginning of the 1960's.

Today — and especially after the sinking of **Eilath** in 1967 — several other western navies are also aware of the possibilities in equipping small and fast vessels with modern missile-systems for the surface-to-ship role.

As a result of the early start the Royal Norwegian Navy today has a weapon-system which represents a considerable increase in the effectiveness of the navy.

Technological background:

A definite trend over the past decade has been the rapidly increasing unit prices of aircraft, naval vessels, tanks etc. When the Royal Norwegian Navy in the late fifties during the planning of the 1960 shipbuilding programme was confronted with this problem, the answer was a navy with emphasis on small and fast vessels. At this time the transistor and the computer technique had made small and effective radars for detection, and small digital computers for calculation of target data available or possible. The open question was a weapon to supplement the torpedoes and the small guns of a fast patrol boat.

On this background PENGUIN as an idea emerged nearly ten years ago as a synthesis of requirements and technological possibilities. PENGUIN was one of the first

PENGUIN Missile

representatives of a new generation naval armament; the surface-to-ship guided missile. The realisation of this idea to the finished product of today is closely linked to the rapidly developing technologies in detectors of heat emission, high precision gyroscopes, microminiaturized components and electro-optics. These technologies have primarily been forwarded for space research, telecommunication and defence purposes, mainly headed by the U.S.A.

Ten years ago the state of art of the above mentioned technologies did not permit the production of a surface-to-ship missile of the right size to be carried by the Norwegian vessels and at the same time being in possession of the efficiency required at an acceptable cost. It was, therefore, decided to start the development of a surface-to-ship system at the Norwegian Defence Research Establishment, based on the Royal Norwegian Navy's main requirements.

A system like PENGUIN is no one-man job. A large number of highly qualified technicians, scientists and officers from the navy, the industry and the Research Establishment have been involved and have together created the present result.

The development has been monetarily supported by the U.S.A. and the Federal Republic of Germany through bilateral agreements, and the U.S. Navy has in a very generous manner contributed to the programme with technical information and by placing their test-facilities at disposal; test-facilities of a type that do not exist in Europe and which a Norwegian project could not afford, neither economically nor technically.

Significant for PENGUIN as a developed project is that the combination of naval and technological competence and understanding at an early stage managed to define and specify a new development line for a naval weapon. The target has been daring but realistic, and closely connected to well defined requirements. The result is that it has been possible with limited resources to produce a weapon system that is not only modern today, but has a growth potential for a long period ahead.

Main requirements:

The study and evaluation of the Norwegian Navy's tasks in the 1970's led among other things to the following main requirements for the PENGUIN system:

Range comparable to maximum effective radar range for F.P.B.s.

Warhead capable of inflicting serious damage on a destroyer.

Passive mode of operation.

Self-contained missile, independent of own ship after launch.

System size, weight and cost consistent with the F.P.B. concept.

These requirements have been met and the Royal Norwegian Navy will during the next 2-3 years install the PENGUIN-system on 26 F.P.B.s and 5 frigates. The first system will be operational this year.

The PENGUIN-system consists of a ship installation and missiles. The missile is inertially guided and utilises passive homing for terminal guidance. Before launch, data on future target position is fed to the missile inertial guidance. In flight the missile is fully self-contained and independent of further information from own ship. The ship installation comprises fire control and launchers.

When a target is acquired, the fire control computer calculates the bearing to the predicted point of hit, and the missile inertial guidance is automatically slaved to the computer data. The missile is fired in the general direction of the target. After take off the missile follows a programmed trajectory in the direction of the predicted point of hit.

A passive target seeker in the missile searches a strip of the sea in the direction of flight. When the target is detected, the seeker tracks the target and seeker information is used to guide the missile to impact.

The missile is mounted on a simple launcher which is built into a container which serves as protection against rain, spray and wind, and also as the packing for transport to and from the ship. This unit — the so-called Box-launcher — with the missile is delivered as a complete and tested unit from the base to the ship. The weight of the Box-launcher with missile is only about 500 kg. The unit is placed on a prepared foundation on deck, the umbilical cord connected and the missile is ready for firing. The system is operated and the missiles are fired from the operator's panel in the operation room. The missiles are controlled and auto-tested by the missile control panel. Except for the auto-testing no tests, service or repair of the missile will be done onboard.

PENGUIN — CONTINUED

"Storm" Class with 6 PENGUINS fitted.

General Data

Missile range	20 km plus
Missile speed	High subsonic
Missile weight	330 kg
Missile length	3 m
Missile diameter	28 cm
Missile wing span	1.4 m
Warhead weight	120 kg
Fuse type	Impact
Motor, boost and sustainer	Solid propellant
Target seeker	Heat seeking
Flight profile	Variable
System weight, installed with 6 missiles	Approx. 4 tons
Weight of launcher-container with missiles	Approx. 500 kg

Production and Present Status

The task given to the Naval Logistic Command by the Naval Staff in the early sixties was to develop, test out and produce a surface-to-ship missile system that should be operational in 1970. This target called for close co-operation from the very beginning between the Navy, the Defence Research Establishment and the producer A/S Kongsberg Vapenfabrikk. All these parties have been involved from the start and the project has been transferred from a research project at NDRE to a product in production at A/S Kongsberg Vapenfabrikk in a continuous process, so that valuable time has been saved and the target data met.

The system is in production, and the installation of the first system onboard one of the Norwegian F.P.B.s started.

The torpedoboats of the SNOGG-class will be equipped with PENGUIN-systems including 4 missiles onboard, and the gunboats of the STORM-class will have systems with 6 missiles onboard in addition to their present armament.

Platforms

Due to its low weight and small space requirements and flexibility in positioning and number of launchers the PENGUIN-system is well suited for installation on any type of ship down to F.P.B. size. The data needed by the missile are few and simple and make it easy to utilise existing fire control equipment for integration with the PENGUIN-system. The system is also well suited for coastal artillery purposes as a fixed or semi-mobile system and a study carried out shows that the missile may, with minor modification only, also be used from helicopters.

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THE UNITED STATES NAVY AND SOUTH EAST ASIA

By Admiral Arleigh Burke

The United States is now withdrawing its ground forces from Vietnam — all critics to the contrary notwithstanding. But this withdrawal will not reduce the requirement for an American strategy offering some hope to the nations of Asia that the United States has an interest in their future.

This hope is implied strongly in the Nixon Doctrine, which, despite all its ambiguities, means in essence that the United States will meet its commitments and aid its allies and others wishing our support by supplying weapons and material for indigenous forces and also by assisting their ground troops with our air power, fire power, and logistics.

The only way this Doctrine can be fulfilled is through a strong maritime strategy. The strategy will require a hard-hitting modern naval force in readiness, not only in Vietnam, but in other parts of the world as well. The strategy will be effective only if it is implemented with the appropriate combat ready capabilities able to undertake the necessary operations promptly, as well as "show the flag" in all the oceans of the world.

The final control of an area in any post-Vietnam war will, as always, be determined by the foot soldiers, but in the future, given the changed political and military environment, the United States will expect the foot soldiers to be supplied by the indigenous powers. America cannot lend its support to such indigenous powers, let alone conduct any of its own military operations overseas, unless it has the naval power to maintain control of the seas in the area of conflict, as well as the sea lines of communication between the war theatre and the United States. As the United States reduces its combat forces on the ground in Vietnam, the South Vietnamese are doing a splendid job in developing a ground warfare capability. Yet even after they take full responsibility for all ground combat it is still possible that they may some day need quick fire power support and, if such is the case, it will be necessary for the United States Navy and Marine Corps to provide it. Beyond this, assuming the South Vietnamese hold their own and bring the war to an end, the United States must continue to have adequate Marine forces afloat to deter potential re-emergence of the conflict in Vietnam or to assist the Vietnamese in dealing with aggression, should deterrence fail. These forces should be capable of intervening quickly and being withdrawn quickly once they have made their contribution to the restoration of peace and stability in the area — much like they were able to do so successfully in the Lebanon in 1958. This ability to engage decisively and disengage quickly is the inherent strength of a maritime strategy. It has been neglected or ignored by most post-World War II administrations in the United States, even those committed to a strategy of maximizing military flexibility.

While the United States has been historically considered a sea power and the Soviet Union a land power, it is the Soviets who recently have been making the greatest effort to bolster their sea power, as we can see in the Mediterranean, east of Suez, and now it would appear even in the Caribbean. Significantly, they have placed equal emphasis on building both nuclear and conventional naval capabilities.

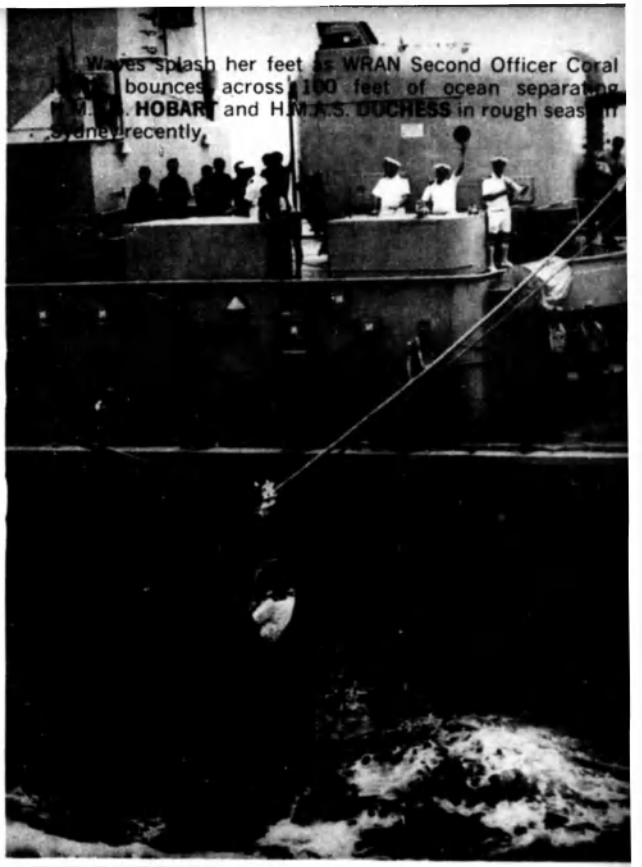
The Soviets have already had success in re-orienting political thinking in the Mediterranean. This is particularly noticeable in the changed policies of Turkey and Iran, who have adopted more neutral policies as they see signs provided by the ample presence of the Soviet Navy to the south of them that the Soviet Union will eventually dominate this area.

This changing attitude in such countries as Iran and Turkey may well be duplicated in other areas of the world, and particularly in the area east of Suez, including southeast Asia. If there is no U.S. military presence to give these indigenous nations confidence, inevitably they will feel the necessity of adjusting their policies to accommodate the only other major powers in the region, which in the near future will be the Soviet Union, and at some later date possibly communist China.

The United States has left only the option of a maritime strategy and its implementation. This will require a very large and modern navy capable of "showing the flag" and conducting the necessary supporting military operations in all areas of the world. The question is rapidly arising as to whether the U.S. Navy will long be capable of meeting this great responsibility. Its capability is now marginal due largely to the age and neglect of our surface fleets. The decision must be made now to develop rapidly the kind of modern navy needed to effectively implement a maritime policy and strategy. This will be as true for southeast Asia as it is for areas as close to our shores as the Caribbean.

If we do not pursue the only acceptable strategy open to us under the Nixon Doctrine, i.e., a peripheral maritime strategy, then the United States will be unable to adequately support our various treaty commitments around the world, and we will also be setting ourselves on a course destined to relegate us to the status of a second-rate power. Such a development will be neither in the interests of the United States nor world stability.

A Cheer for Second Officer Horne



Waves splash her feet as WRAN Second Officer Coral [illegible] bounces across 100 feet of ocean separating H.M.A.S. **HOBART** and H.M.A.S. **DUCHESS** in rough seas off Sydney recently.

Coral, 23, was making the first jackstay transfer by a woman in the R.A.N. and she was "glad to get to the other side".

The jackstay transfer is a method used by the Navy to transfer goods or people between ships at sea. The operation is carried out under way with the ships steaming parallel to each other.

Until WRAN Horne tried it, it was strictly a male event.

"I wasn't expecting to enjoy it, but I'm glad I did it.

"I had wanted to do something different and then this opportunity came up.

"The crossing from H.M.A.S. **HOBART** to H.M.A.S. **DUCHESS** was made in heavy seas, and I wasn't looking forward to it at all, but I was determined to do it.

"I was told what to do. Then I put my foot into the stirrup and hung on with both hands. The next moment I was on my way.

"I started off holding on quite lightly. But then I suddenly stopped between the ships and dipped down towards the water. From then on I wrapped myself as tightly as I could around the rope.

"Then I was on my way again and the next moment I was on **DUCHESS**'s deck.

"I was happy to reach **DUCHESS** and so glad I didn't have to go back again.

"When I reached **DUCHESS** a great cheer went up from **HOBART**. I think every man on the ship was on deck to see me cross."

Coral who came from Mount Martha in Port Philip Bay, Victoria, has been in the WRANS for 3½ years. She received her commission in March, 1968.

When she joined she was Coral Ashby, but she was married on January 9 in the chapel at H.M.A.S. **CERBERUS**, Westernport, Victoria, to Lieutenant Commander A. V. R. Horne, who is in command of the general purpose research vessel H.M.A.S. **KIMBLA**.

Coral who is on the staff of the Flag Officer Commanding the Australian Fleet, believes that WRANs benefit from participating in Naval activities such as her jackstay crossing.

"It helps us to see the Naval side of the service and makes it seem more like one Navy", she said.

NEW! Oce Diazo Adhesive Film

A clear film with an adhesive back that saves time in the drawing office. Ideal for printing circuits, notices, instructions, etc.

Now you can copy a circuit, notice, plan or specification direct on to Oce diazo polyester adhesive film in a diazo printer, make as many copies as you like, then peel off the adhesive backing and stick on to any surface as a permanent record for everyone to see.

Oce adhesive film saves time in the drawing office too. Say you want to alter a portion of a plan, then take the original and make an Oce diazo transparent copy on either paper or film. Eradicate by chemical means the unwanted part or parts of the drawing on the copy then back to the original plan and plac tracing sheet over the portion you wa to alter and draw in the changes. Th expose through a diazo printer on to O polyester adhesive film and develo Take off the backing sheet and stick over the transparent copy and you hav new master plan from which you make more copies.

You'll be amazed at the number of u you'll find for this new film. Ask fo sample sheet.

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r Diazo Process

re's a real breakthrough for diazo nting. Post Chromtex film in ten autiful colours, red, yellow, blue and ick, magenta, cyan, green, orange, own or violet. Use them as colour erlays for engineering or chitectural drawings. Process ough ammonia type diazo printer as ickly and easily as ordinary diazo per. Accurate register assured.

eal for charts, maps, reports, awings of all kinds. Easy to overlay e, two, three or more colours on top one another. Saves drawing time, es true, high fidelity reproduction.

Anti-Static Drafting Film

New anti-static drafting film does not store static electricity . . . eraser crumbs and specks of dirt don't cling to the surface . . . goes through diazo printer with the greatest of ease. Arkwright Anti-Static film gives a better inking surface . . . very durable, matte finish takes pencil or ink to give dense clear lines that reproduce sharply. Plenty of tooth too, erase quickly and easily without ghosting. Non glare surface absorbs light . . . very easy on the eyes. Sheets won't cling together no matter how long you store them. Single or double matte surface.

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Nautical Notes from all Compass Points

By "Sonar"

CANADA

SPIRALLING DEFENCE COSTS

Canadian Defence Minister Donald Macdonald intends to set up a management review group to study warship acquisition programmes and recommend ways to improve them.

The announcement came in the wake of the disclosure that estimated cost of the four Canadian helicopter-carrying destroyers now under construction has risen to $252 million from $220 million when contracts were awarded in 1968.

Since September of 1966, when the basic design of the four vessels was set, the cost estimate has increased by 25 per cent from $192.7 million.

A statement released by the minister's office said original cost estimates were not realistic.

The chairman of the review group will be from private industry, and other members will represent both the private and public sectors of the economy. Composition of the group is expected to be announced soon.

The statement disclosed that disputes have arisen between the Defence Department and Marine Industries Ltd. of Sorel, Quebec, one of two St. Lawrence River shipyards constructing the highly sophisticated destroyers.

While the company is enjoying a full order book and work is being satisfactorily completed, directors are finding soaring costs, particularly higher wages, extremely worrying.

The other is Davie Shipbuilding Ltd., of Lauzon, Quebec. Each firm is building two vessels, but Marine Industries Ltd. has been designated the lead yard since it is producing the first ship in the series.

The disputes still have not been settled, the statement makes clear. The $252 million cost set out in Federal spending estimates is described as a "ceiling" imposed by the Government.

Frequent disputes already had occurred by mid 1969, says the statement. They were caused by design modifications, claims for extras from the shipyards, and problems concerning equipment supply.

The differences with the shipbuilders now are under negotiation.

An inter-departmental review of the project was undertaken last summer. One of its conclusions was that the joint defence department-supply and services department project office had insufficient authority for centralised control of the programme.

NEW COMMANDER MARITIME COMMAND

Rear Admiral Robert W. Timbrell, D.S.C., C.D. (photographed) will be Commander, Maritime Command, with headquarters at Halifax, from 15 October, 1971.

He succeeds Vice Admiral H. A. Porter, whose appointment as Comptroller-General at Canadian Forces Headquarters in early November, 1971, was announced recently.

Admiral Timbrell entered the Royal Canadian Navy in August, 1937. During the period 1937-1940 he served in various ships of the Royal Navy, and in June, 1940, while in command of a commandeered yacht for the evacuation of Dunkirk, he was awarded the Distinguished Service Cross. He was the first Canadian officer to be decorated during World War II.

He specialised in torpedo anti-submarine warfare, was in charge of anti-submarine schools ashore and commanded the ocean escorts, H.M.C.S. **SWANSEA** and H.M.C.S. **ST. LAURENT**, the first of Canada's totally designed and built new destroyers.

After a number of senior appointments he took command of the aircraft carrier H.M.C.S. **BONAVENTURE** from August, 1963 to 1965 when he was appointed Director, Officer Cadets, for the three services at Canadian Forces Headquarters.

In July, 1965, he was promoted Commodore and posted to the staff for the new integrated Canadian Forces Training Command, Winnipeg, Manitoba, where he served as Chief of Staff, Programmes and Research.

Rear Admiral Timbrell was promoted to his present rank in September, 1967, at which time he was appointed Deputy Chief for Plans at Canadian Forces Headquarters.

NEW HELICOPTER DESTROYERS (Refer previous report — Spiralling Defence Costs)

The last of four helicopter carrying destroyers under construction for the Canadian Forces' Maritime Command was launched at Davie Shipbuilding Ltd., Lauzon, on Friday, 23 April, 1971.

[redacted]

Davie Shipbuilding Ltd., which is building two of the four ships of the DDH 280 class, launched the **ALGONQUIN** (DDH 283), which is being constructed utilising advanced shipyard techniques involving extensive pre-fitting of the ship's sections. The other vessel being built by Davie, the **ATHABASKAN** (DDH 282), was launched last November. The **IROQUOIS** (DDH 280) and **HURON** (DDH 281), under construction at Marine Industries Ltd., Sorel, were launched last November and 3 April, 1971, respectively. All four ships are scheduled to be completed in 1972/3.

The major systems for the ships have been designed and developed in the Canadian Forces and by Canadian industry over the seven years since the programme was announced in December, 1964. They include a gas turbine propulsion plant; computerised command and control system, improved sonar equipment for submarine detection and automatic weapons and communications systems. Each ship will be equipped to operate Sea King anti-submarine helicopters.

The ships are 425 ft. long, with a beam of 50 ft. and displace 4,100 tons. They will carry a complement of 310 officers and sailors.

OPERATION RUSTY RAZOR

Four Halifax-based ships and Argus aircraft from 404 Squadron, C.F.B. **GREENWOOD**, Nova Scotia, exercised for a week beginning 1 May, 1971, off the west coast of Portugal in a medium-scale NATO maritime exercise.

Destroyer escorts **MARGAREE**, **ASSINIBOINE** and **OTTAWA**, in company with the operational support ship **PROTECTEUR**, joined with ships and aircraft from seven other nations to test men and equipment during a simulated seaward defence of Western Europe.

Code-named **RUSTY RAZOR**, the exercise was conducted by Admiral C. K. Duncan, U.S.N., Supreme Allied Commander, Atlantic, and Admiral Sir William O'Brien, Commander-in-Chief, Channel.

Participating countries included Belgium, France, Germany, The Netherlands, Portugal, the United Kingdom and the United States.

BRAZIL

TERRITORIAL LIMIT EXTENDED

President Emilio G. Medici has issued a decree extending Brazil's territorial waters to 200 miles. The old limit was only 12 miles.

The decree was viewed as evidence of Brazil's growing interest in offshore oil production, as well as a government decision to protect a growing fishing industry.

Brazil thus joins Chile, Peru, and Equador, which also have 200-mile limits. U.S. tuna boats occasionally violate these limits and are released from custody only after paying fines.

ORDER FOR SIX FRIGATES

A 100 million pound ($214,290,000) order for the design and construction of six frigates for the Brazilian Navy has been placed with the British firm, Vosper Thornycroft.

Four of the ships — two anti-submarine frigates and two general purpose frigates — will be built in Britain and two anti-submarine frigates will be built at the naval dockyard in Brazil, with materials, equipment and services supplied by Vosper Thornycroft.

Powered by a combination of gas turbine and diesel machinery, the vessels will have a length of 424 ft. and a displacement in excess of 3,000 tons.

Design work is expected to be completed in time to begin construction on the first British-built ship early in 1972.

Each vessel will take approximately four years to build, with ships being laid down at yearly intervals, so that the last vessel should be completed in 1979.

Included in the contract is the provision by Vosper Thornycroft of complete support services, comprising the supply and cataloguing of base and on-board spare parts, maintenance instructions, planned maintenance routines and training.

DENMARK

NEW ENGINES FOR PATROL BOATS

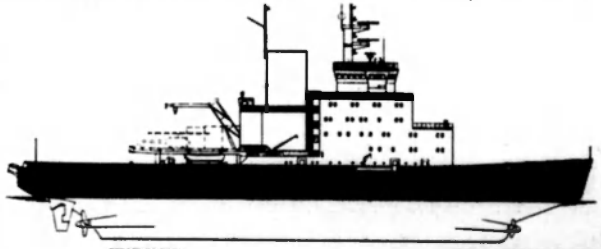
The Royal Danish Navy has ordered six Rolls-Royce Proteus gas turbines with an option for 12 more, to power a new class of fast patrol boats.

The Navy has already a squadron of six Proteus-powered boats in service and altogether 11 of the world's navies have ordered more than 200 of these units for use in patrol boats, torpedo and gunboats, hovercraft, hydrofoils and frigates.

The Proteus has a maximum output of 4,250 b.h.p. and full power is achieved within a minute of starting. It can be readily adapted to fully automatic control — meaning complete control from the bridge of a vessel.

FINLAND

The Finnish Board of Navigation have ordered a diesel-electric icebreaker of a completely new type from Oy Wartsila, Helsinki, for delivery in 1975. Her displacement will be 8,000 tonnes (metric) and her principal dimensions will be 103.5 m long, 23.8 m in breadth and with a draught of 7.3 m. Her primary power will be delivered by five Wärtsilä-Sulzer 12 ZH 40/48 type 12 cylinder medium speed non-reversible 2 stroke diesel engines developing 4,650 b.h.p. at 410 r.p.m. These will be connected to Strömberg double-armature propelling motors, and the power will be distributed so that 60% is conveyed to the aft propellers and 40% to the forward ones, with a total output of 20,000 s.h.p.



NAUTICAL NOTES

FRANCE

FRANCE BUILDING 20 BOATS FOR FEDERAL GERMAN NAVY

A spokesman for the Federal Ministry of Defence (Germany) has reported the order for 20 missile speed boats in France. The probable construction yard is Constructions Mécaniques de Normandie (formerly Amiot yard). These little units will be derived from the famous **SAAR** type delivered by these yards to the Israeli

Characteristics will probably consist of a displacement of 240 tons under full load; two 7,400-h.p. oiesels (total of 14,800 h.p.), for a maximum speed of 40 knots; and armament consisting of four surface-to-surface MM 38 Exocet missiles, one single-mount Oto Melara Compact 76 AA and two 533 torpedo launchers (torpedoes, wire-guided).

The Amiot yards are presently building four boats for the Greek Navy. Except for the guns, which are two double mounts of AA35S, these little units are identical to those destined for the Bundesmarine. Four similar units have been ordered from the Franco-Belgian yards for Malaysia.

The 20 boats ordered from France by Germany will be added to ten 143 type missile-launching boats to be constructed in Germany between now and 1974. The characteristics of the 143s are: a full-load displacement of 350 tons; four 3,000 h.p. motors for a speed of 30 knots; and armament, consisting of two single AR ramps with two surface-to-surface Tartar missiles (one ramp, one reserve underneath ramp), one or two single 76 AA Oto Melara Compact turrets and two torpedo launchers (wire guidance).

GREECE

NAVY ORDERS FOUR F.P.B.s FROM FRENCH SHIPBUILDER

The Greek Navy has placed an order with Constructions Mécaniques de Normandie for four 40-knot gunboats carrying the Nord Aviation Exocet MM38 missile.

These craft will be similar to the **Mivtac'h**-class vessels of the Israeli Navy.

They will be 154 feet 2 inches in overall length, 23 feet 4 inches in breadth, and will have an 8-foot draught.

Displacement will be 250 tons at full load, and the machinery will consist of four high-speed MTU (Mercedes Benz) Vee-20 engines, developing a total of 13,500 b.h.p. Thirty tons of bunkers will be carried, giving a range of 800 miles at 30 knots, and 2,500 miles at 15 knots. They will carry a complement of five officers and 30 enlisted men.

Designed and built by Boeing, the Tucumcari has been in service with the U.S. Navy since 1968, and is the fastest heavy-weather craft in the world.

The Alinavi craft will displace about 59 tons, be about 72 feet long and 23 feet wide.

It will have a maximum speed of 50 knots and will be able to maintain cruising speed of more than 40 knots in rough water conditions of the Mediterranean and Adriatic Seas, where wave heights of three to 10 feet are common.

The hydrofoil will be armed with ship-to-ship missiles, and with an automatic anti-aircraft cannon, both of which will be controlled by an advanced fire-control system.

The craft will have a waterjet propulsion system for foilborne operations at high speeds. The system will consist of a Rolls-Royce Proteus gas turbine of 4,500 horsepower driving the waterjet pump.

Hullborne propulsion will use a diesel engine and retractable propeller unit.

The craft will be built at the Italian firm, Oto Melara's plant in La Spezia, with delivery to the Italian Navy scheduled in 1973.

A model of the Italian Navy missile-armed hydrofoil.

ITALY

NEW MISSILE-ARMED HYDROFOIL

The Italian Navy has ordered the prototype of a new type of hydrofoil which can maintain high speed even in rough water. Called Alinavi, the boat features fully submerged foils.

The contract has been awarded to Advanced Marine Systems-Alinavi SPA, which was formed in 1964 by the Boeing company of the United States, a corporation of the Italian IRI group and the Italian shipbuilder, Carlo Rodriquez.

The organisation develops in Europe advanced commercial and military marine vehicles.

The new craft, designed by Alinavi for operations in the Mediterranean, is an improved version of the Tucumcari hydrofoil gunboat.

NAUTICAL NOTES

JAPAN

NEW MARINE GAS TURBINE DEVELOPED FOR JAPANESE NAVY

A marine gas turbine fuelled by standard diesel engine fuel has passed acceptance trials at Ishikawajima-Harima Heavy Industries Company Limited, aircraft engine factory in Japan. It will be part of the propulsion machinery in a new Japanese Navy torpedo boat.

Known as the IM 300, the new engine has been developed from aircraft gas turbines. In the ship, two turbines, mounted side-by-side, will drive a centre propeller through reduction gears. The other two propellers will be driven by two diesel engines.

The IM 300 has a rated output of 1,775 s.h.p. metric at a free turbine speed of 12,480 r.p.m. The two engines are geared to a reduction gearbox which drives the output shaft at 1,700 r.p.m.

BUDGET, 1971

Japanese Self-Defence Forces will have an overall 1971 budget of about $1,659,000,000, with substantial provision for new aircraft procurement for all services. The Air Self Defence Force will get 48 McDonnel Douglas F-4EJ interceptors (with the unit price increased 3% to the equivalent of $4,288,000), two NAMCO C-1 transports, two Boeing Vertol 107 helicopters, and two Mitsubishi MU-2s for search and rescue. The Maritime Self Defence Force will get 11 Kawasaki P-2J aircraft, five Shin Meiwa PS-1 flying boats, six Sikorsky HSS-2s (all three types equipped for A.S.W.) and two Boeing Vertol 107 helicopters; and the Ground Self Defence Force will buy one MU-2 (in the LR-1 reconnaissance-support version) and a range of helicopters, including 10 Hughes OH-6s (LOH type), 11 Bell UH-1s, six Boeing Vertol 107s (transport) and one TH-55 trainer.

THE NETHERLANDS

THE WETSUB

An invention by a Dutch engineer, Dr. H. Lok, will no doubt attract a lot of attention.

In conjunction with a development company Dr. Lok has designed a two-man submarine, capable of carrying a payload of 200 kilos. The **WETSUB** can operate to a depth of about 330 feet and travel at a speed of about 5 miles an hour. The cost of the standard model as far as submarines go, is very modest, namely about 25,000 Australian dollars. The craft is suitable for all sorts of investigation and inspection work but it can also be used, according to the inventor, for recreational purposes. One of the first institutions to show a lively interest in the new submarine was the Royal Netherlands Navy.

RUBBER FIRE-FIGHTING BOAT (3629).

A Dutch company which has specialised in the manufacture of fire-fighting equipment has developed a compact fire boat, which consists of an inflatable rubber float, with a frame mounted on it carrying the fire extinguishing unit.

The equipment includes two powder-type extinguishers, a searchlight, a blue rotating light, on-board illumination and an electric ship's horn.

The extinguisher unit comprises a motor-driven nozzle, on which are mounted a water gun and a foam gun. The nozzle is equipped with a single-stage high pressure centrifugal pump, with a capacity of 1000 litres a minute at a pressure of 80 metres head.

The pump is powered by a 4-stroke petrol engine with a capacity of 34 h.p., provided with a polyester bonnet.

The U-shaped float, which is subdivided into five air chambers by ball partitions, is assembled from three layers of rubber fabric and two nylon layers between the rubber layers.

The composition of the rubber is such that it meets all the requirements with respect to wind and weather resistance, and resistance to oil and ozone.

On the floor of the vessel a watertight bilge pump is installed, which has a capacity of 1350 litres a minute. This pump can operate dry without harmful consequences.

The boat is propelled by an outboard motor, with a capacity of 45 h.p. This motor drives a three-bladed propeller and is provided for deep water operation with an automatic tilting mechanism which can be blocked in five different positions.

A specially designed trailer can be provided with the boat suitable for road transport at a maximum speed of 100 kilometres an hour. This trailer carries a winch which can be used to launch the fully equipped fire boat and to remount it on the trailer when the operations have been completed.

The boat is 4.65 metres long, 2.15 metres wide and has a bow height of 0.3 metres.

NIGERIA

An order has been placed by the Marine Force of the Nigerian Police for eight, 34 ft. **KEITH NELSON** general purpose launches, to be built at the Portchester shipyard of Vosper Thornycroft Ltd. The total value of the contract, including spares, is approximately 150,000 pounds.

The boats will be constructed of glass reinforced plastics, including hulls, decks, superstructures, internal tanks and engine girders. Sleeping accommodation for two men is provided in the forward cabin and in addition there is a wheelhouse shelter and a large cockpit aft, covered by an awning, which provides space for the carriage of 22 additional men or more than a ton of stores. The craft will be powered by twin Perkins T.6.354 engines giving a speed of over 19 knots. No armament will be fitted.

The boats will be used for policing the inland waterways of Nigeria, which amount to a total length of some 55,000 miles.

NORWAY

NORWEGIAN NAVY GETS FIRST OF SIX FAST PATROL BOATS

The Boatservice Verft of Mandel has delivered the fast pastrol boat **Snogg** (P-980) to the Norwegian Navy. It is the first of a series of six ordered from that yard.

The five other patrol boats will be the **Rapp** (P-981), **Snar** (P-982), **Rask** (P-983), **Kvikk** (P-984), and **Kjapp** (P-985).

Characteristics of these fast patrol boats are:
Displacement: about 140 tons
Length: 121 feet
Propulsion: diesel
Maximum speed: 36 knots
Armament: 4 TLT/533 and 4 surface-to-surface Penguin missiles, or 6 TLT/533 and 6 missiles; 1/40 AA. 70-caliber Bofors
Complement: 3 officers and 7 enlisted men.

The Penguin is a subsonic surface-to-surface missile, with an 11-foot fin span, five-foot diameter, weighing 254 pounds, and a range of from ten to 12 miles.

NAUTICAL NOTES

SOUTH AFRICA

FIRST OF THREE FRENCH SUBMARINES

The first of three Daphne class submarines ordered from France by South Africa in 1967 was handed over at Lorient.

She is the **MARIA VAN RIEBEECK**, a high-performance submarine of 700 tons, with a maximun speed of 16 knots.

The torpedo recovery vessel FLEUR is the first operational ship to be built for the South African Navy, to whom she was handed over during 1970.

The principal characteristics of such vessels are their completely silent operation submerged and their greatly increased diving capabilities.

The others ordered by South Africa are under construction. Portugal and Pakistan have each ordered two, and Spain has also adopted the type.

SPAIN

U.S. TO LEND 16 SHIPS TO THE SPANISH NAVY

The United States has agreed to lend Spain five destroyers, four ocean mine-sweepers, two submarines, three landing ships, an ammunition ship, and an oiler, the Spanish Navy Minister Admiral Alfonso Baturone announced.

He told a meeting of government officials that the cost of the material part of the U.S.-Spanish Friendship and Co-operation Agreement signed last year originally was estimated at $88 million.

SWEDEN

TORPEDO TRACKING EQUIPMENT

The Royal Swedish Navy has ordered a further set of torpedo tracking equipment from Marconi Space and Defence Systems Limited. This 63,000 pound contract follows the successful trials of a first set of equipment installed in a Swedish submarine during 1969.

The tracking equipment provides a record of the trajectory of a suitably equipped torpedo fired by, or against, a submarine. It is completely automatic in operation and produces weapon track data in real-time. It will track an approaching weapon from long range and automatically change over to a high-definition, high accuracy tracking mode as the weapon closes on the target in the final attack phase.

TRINIDAD AND TOBAGO

H.M.T.S. CHAGUARAMAS

A 103 ft. fast patrol boat for the Government of Trinidad and Tobago was launched on 29 March, 1971, at Vosper Thornycroft's Portchester shipyard. The launching ceremony was performed by Mrs. D. C. Granado, wife of the High Commissioner for Trinidad and Tobago to the United Kingdom, who named the ship **CHAGUARAMAS**, the name of the north western peninsula of the Port of Trinidad.

A bottle of Trinidad rum was used for the ceremony, decorated in red, black and white, the national colours of Trinidad and Tobago.

H.M.T.S. **CHAGUARAMAS** is the first of two fast patrol craft building for the Government of Trinidad and Tobago, the value of the order being approximately three quarters of a million pounds.

Both craft will have a speed of 25 knots and will be similar to H.M.T. Ships **TRINITY** and **COURLAND BAY** which were designed and built in 1964/5. A number of minor improvements are being incorporated in the two new ships as a result of development work during the intervening years.

UNITED KINGDOM

EXTENDED SEA TRIALS ABOARD H.M.S. ALBION FOR WEATHER PICTURE RECEIVING EQUIPMENT

First sea trials of a Hawker Siddeley Dynamics weather satellite

NAUTICAL NOTES

picture receiving system on board the commando ship, H.M.S. **ALBION** have proved so successful that the equipment has been re-installed for an extended evaluation period.

An omni-directional aerial to receive satellite transmissions at sea has been specially developed for these trials.

The photograph shows a ship's officer operating the equipment to obtain a weather picture. The weather pictures can be reproduced instantly by means of a facsimile recorder, and can cover a sea area of about two million square miles, centred on the receiving station.

Currently, H.M.S. **ALBION** is in the Far East on a period of duty.

SHIP FOR SALE

The Ministry of Defence has decided to sell the 27,000-ton carrier **CENTAUR**, built in 1953. It was taken out of service in 1963.

If no navy wants to buy it as an aircraft-carrier, the vessel will be sold for scrap.

AUTO PILOT SYSTEM

Type 42 destroyers of the Royal Navy are to be equipped with automatic steering controls supplied by S. G. Brown Ltd. of Watford. Suplicated steering control systems suitable for inclusion in the versatile console system plan (V.C.S.) currently employed by the Royal Navy will be installed in the bridge area and in a secondary position. Each position will have hand steering facilities and duplex automatic pilot units.

Full course change facilities are available at each position which allow alterations of course up to 359 degrees. Manual control is provided for limiting maximum rudder movement while weather helm and counter rudder are applied automatically. Although manual operation is kept to a minimum, a necessary safety device is provided to cut out the auto pilot system automatically. This is achieved by application of 'hard over' on the hand control.

A split servo system has been specially designed to control the steering engine. All course, steering demand and response signals are computed and controlled locally in the after steering compartment, preventing any interference from external electrical sources.

Similar units are being supplied to the R.N. for Type 82 and Type 21 destroyers.

NUCLEAR SUBMARINE SIMULATOR DELIVERED

A comprehensive simulator for the propulsion unit of a British nuclear submarine was officially opened by the Flag Officer (Submarines), Vice Admiral J. C. Y. Roxburgh, C.B., C.B.E., D.S.O., D.S.C. Built by Marconi Space and Defence Systems Limited at Hillend, in Fife, under sub-contract to Rolls-Royce and Associates, this unit will provide realistic crew training facilities for Naval personnel, in actual operational conditions, and save a very great amount of the training which would otherwise have to be carried out at much greater expense in operational submarines.

The simulator provides a complete replica of the propulsion control room in a nuclear submarine, with all of the instruments and controls of a real submarine system. An

ICL4130 computer system, and simulation units designed and built by Marconi Space and Defence, will provide all the reactions and indications of a real system. A separate control position enables an instructor to present trainees with emergency situations of all types, including the most serious that can be envisaged. This type of training is virtually impossible to produce safely in a real submarine.

The simulator, code-named FASMAT, is installed at the Clyde Submarine Base, H.M.S. **NEPTUNE**, near Helensburgh. The installation was completed and final tests carried out successfully over five weeks in advance of the scheduled time, and the complete training facility is now in full operation.

NEW PROTOTYPE LIFEBOAT

This new 52-foot self-righting lifeboat — the product of two years' research by Britain's Royal National Life-boat Institution — was tested recently off the south coast of Britain. Capable of a speed of 18 knots, she has 24 watertight compartments . . . and a foam buoyancy system that would keep her afloat if all 24 were holed!

The controls and instruments, electronic and navigation equipment are fitted in the aluminium wheelhouse, making it unnecessary for a crew member to be in the engine room when the boat is at sea. A flying bridge on the after end of the wheelhouse is fitted with a steering position with revolution counters and an echo-sounder repeater.

The hull was designed by Mr. J. A. McLachlan of Glasgow and is constructed in cold-moulded wood; but future boats of this class are planned with glass reinforced plastic hulls.

UNITED STATES OF AMERICA

GENERAL DYNAMICS TO BUILD 7 ATTACK SUBS

General Dynamics has been awarded a U.S. Navy contract with a ceiling price of $U.S.428.1 million to build seven high-speed attack submarines.

The Navy also awarded two contracts to Tenneco Corporation's Newport News Shipbuilding and Drydock Co. with a total ceiling price of $U.S.332.5 million to build five submarines.

The Navy said the contracts are for the first increment of a submarine programme. Observers said eventually 17 to 25 submarines will be built.

General Dynamics said its submarine contract will enable it to retain its team of experienced and skilled submarine production workers.

SWEET LIFE FOR U.S. ARMY — BUT NOT FOR MARINES

The time-honoured Army practice of rushing out of the barracks to stand in line in the cold dawn is about to disappear, on orders from the Chief of Staff, General William Westmoreland.

A recent directive from Westmoreland said that reveille formations are to be eliminated, except for ceremonies and training. When they are held, he noted, "They should be musters of all officers and enlisted men from the commander on down."

It is all part of a plan to make the military forces all-volunteer.

The directives banning reveille formations and allowing beer at evening meals brings the Army into line with reforms announced by the Navy some months ago.

The Air Force, while silent on the subject of beer, says it is considering 500 items of reform ranging from promotions to eliminating mandatory black socks.

General Leonard Chapman, commandant of the Marine Corps, says his service will not go along with the new trend.

Other Marine Corps sources say that as far as long hair and sideburns were concerned — both now permitted by the Army and Navy — the Marines will "tighten regulations, if anything".

As for the Army's beer, it will be restricted to 3.2 voltage varieties that may be served "routinely" in mess halls at supper and vending machines to be installed in barracks.

Army commanders should "open the door continuously to individuals in their units" instead of merely at stated times, Westmoreland also ordered.

The Army will seek to "take care of families better and improve service attractiveness to Army wives."

The General noted that it was not enough for officers to be aware of the new approach to army life, that they must see to it that their non-commissioned officers follow through.

FIRST OF A CLASS

The amphibious command ship U.S.S. **BLUE RIDGE** (LCC-19) will be assigned to the Pacific Fleet Amphibious Force. Commissioned on 14 November 1970, the 19,200-ton ship has a speed of 20 knots, is 620 feet long, and has a beam of 108 feet. She has a crew of 269 officers and 1,200 enlisted men. The **BLUE RIDGE** is the largest command ship built for the U.S. Navy.

EA-6B INTRUDER

Grumman's new EA-6B Intruder was accepted into the U.S.N. on January 29, having completed all technical and development stages on or ahead of Navy schedule and successfully passing Navy Board of Inspection and Survey tests on five pre-production aircraft. The first production aircraft (No. 6) has been delivered to Naval Air Station, Whiteby Island, Washington. The EA-6B is a four-place, all weather carrier and advanced base aircraft for electronic counter measures operation. Its primary mission is support of strike aircraft and ground forces, replacing (in the ECM role) the EK-A3B. A planned procurement of 42 aircraft has been scheduled.

RECORD FOR ORION

The U.S.N. has claimed a new world record, established by a Lockheed P-3C Orion ASW aircraft, for non-refuelled long distance flight. Piloted by Commander Donald H. Lilienthal, the aircraft flew from Naval Air Station, Atsugi, Japan, to the Naval Air Test Centre, Patuxent River, Maryland, U.S.A. (a direct line of 6857 st.m., but an actual flight of 7010 miles to skirt the Soviet Kamchatka Peninsula) in 15 hr. 21 min. Previous record distance for the heavy turboprop aircraft class was established by a U.S.S.R. Il-18 — 4761 st. m. — in October, 1967. The same Orion, a production model with no fuel system or engine modifications, claimed seven more records in a period of three weeks — speed and "altitude in horizontal flight" (both Russian held), highest altitude for the type, and four rate-of-climb records in categories not previously attempted in heavy turboprop aircraft.

NEW CLASS FRIGATE TO JOIN U.S. FLEET IN 1974

A new class of nuclear-powered, missile-firing frigate is being added to the Navy's shipbuilding programme for 1970. The new frigate will measure about 600 feet and displace about 10,000 tons fully loaded. Known as the DLGN-38 class, the new ships are similar in design to those currently under construction, but will use more advanced equipment and weaponry and will have greater manoeuvrability.

Because of these improvements, the new frigates will be better able to counter Soviet antiship missiles. Initially, they will be equipped with the Terrier D anti-aircraft missile, but this will be replaced later by the advanced surface missile system (ASMA), which will be able to cope with both aircraft and antishio missile threats. Two dual-purpose launchers will handle both the anti-aircraft and anti-missile missiles and the anti-submarine rocket (ASROC).

The five ships approved thus far represent an investment of about $1 billion. The first of them is expected to join the fleet in 1974.

OVER-WATER BAILOUT SURVIVAL SYSTEM

U.S. Navy Safety Centre, at Norfolk, Virginia, is evaluating an advanced over-water bailout survival system developed by Bendix Corporation's Instruments and LifeSupport Division. It contains a life raft which encapsulates a crewman as he is lowered by parachute, keeping him enclosed and dry when it hits the water and thus free from the risk of drowning or exposure to low temperatures to which he would be exposed when under present systems he tried to enter his life raft, inflated after his immersion. The system is claimed to be especially beneficial for an injured crewman. The Bendix release also claims that the new system eliminates the risk of parachute entanglement, which it says is encountered by two out of five bailing out from aircraft into water. The Bendix system has been successfully tested in bailout trials over the Atlantic.

SEA-BASED BAZOOKA

Used on river craft in Vietnam, the 3.5-inch bazooka pods have proved to be formidable weapons. The pods contain four smoothbore rocket launcher tubes with mechanical and electrical linkages. Dual pods are installed on the forward gun mount of river craft. The bazooka, which has a maximum range of about 900 yards, is used against small bunkers and prepared firing positions; for marking targets for air strikes, and for harassment and interdiction fire on suspected enemy staging areas.

Naval Cadet Force News

NEW SOUTH WALES

QUARTERLY REPORT OF PROCEDURES

This report is for the period 1 January to 31 March, 1971, and covers continuous training, weekend training, and other activities carried out by the Naval Reserve Cadets in New South Wales.

Weekend training took place in the following HMA ships and Establishments:—

Ship Establishment H.M.A.S. **PENGUIN**, 5-7 March, 34 personnel.

Ship Establishment H.M.A.S. **HOBART**, 26-28 March, 12 personnel.

No periods of continuous training were conducted during the period under review.

Commander J. St. B. More, representing the Flag Officer Commanding East Australia Area, carried out the Annual Inspection of the following Units:—

Saturday, 27 February, T.S. **SIRIUS** (Arncliffe Unit); Saturday, 6 March, T.S. **PARRAMATTA** (Parramatta Unit); Saturday, 13 March, T.S. **SYDNEY** (Snapper Island); Saturday, 27 March, T.S. **TOBRUK** (Newcastle Unit).

Naval Reserve Cadet School Sections are now parading in James Cook High School, Kogarah, and in Barrenjoey High School, Avalon Beach.

A Commanding Officers' meeting was held in H.M.A.S. **WATSON** on Saturday, 23rd January from 1000 to 1600. Complete understanding and agreement was reached on all agenda items and where required, appropriate action has been taken.

Arrangements have been finalised with the Army authorities for 6 Senior Naval Reserve Cadets, as part of their continuous training to participate in the Army Cadet Adventure Training Course conducted at Singleton during May. The Army has agreed to provide transport and appropriate Army equipment where necessary.

Excellent liaison continues to be maintained by the Senior Officer with his counterparts in the Army Cadet Corps and the Air Training Corps.

(Sgd.) L. MACKAY-CRUISE,
Commander, R.A.N.R.
Senior Officer.

TASMANIA

The training ship **YORK**, George Town, was commissioned on Saturday, 29 May, 1971, by Commander Robb, State president of the Navy League.

T.S. **YORK** is under the command of Sub-Lieut. R. Coleman.

The naval officer in charge, Tasmania, Commander C. Hutchison, R.A.N., inspected a guard of honour, the ship's company, and instructors.

The Warden of George Town (Mr. L. J. Mooney), said **YORK** was a worthwhile activity for the youth of the municipality.

Mr. G. MacKinnon, president of the George Town Branch of the Navy League, said that boys of 13 and over would be accepted for training.

At present **YORK** has 37 trainees.

VICTORIA

(Compiled by Mr. C. Stitt, Public Relations Officer for the Victorian Division)

The President of the Victorian Division of the League, Mr. F. G. Evans — once again gave a big thank you to the Ladies' Committee and Executive in the form of a morning champagne garden party at his home. This day has become quite an annual event on the League's calendar, and gives everyone the opportunity to get together and chat over the year's events. Interesting to see so many of the Commanding Officers from various Victorian Sea Cadet Units, and judging by some of the animated conversations I witnessed, lots of thoughts and ideas have been passed around.

March the sixth heralded a reversal for the League. Instead of entertaining they were entertained by the Captain and Officers of H.M.A.S. **HOBART**, in port for the Freedom of the City celebrations. This very much appreciated gesture, by the **HOBART**, is we believe something that has never taken place before. Thank you Captain J. Robertson and Officers.

P.S.: Believe you had an extra passenger on the way to Sydney, in the shape of a President?

The Ladies' Committee held another of those very popular film do's down at H.M.A.S. **CERBERUS** on 17th. Numbers were a little disappointing, but by all accounts a most enjoyable time was had by all.

On 20th March, 50 members of the Victorian Division of the League gave a farewell dinner in honour of Commodore Ian Purvis, retiring Naval Officer-in-Charge, and Mrs. Purvis.

During two and a half years, this tireless couple earned the respect and affection of members of the League to an extent few others have done, and we hope that although the Commodore and his wife will be living in Sydney, they will be able to return to their Melbourne friends from time to time.

The dinner was held in the home of Doctor and Mrs. Trevor Hatfield.

Sixty of the Younger Set attended an "in bad taste party" on the 3rd April. Turned out to be a very gay affair, with dress, from football players to ballgowns. Guests included Captain and Officers from U.S.S. **JOUETT**. The 20th is the next big night for the Younger Set, a night at "Casino de Paris".

Pictorial Record of Cadet Training in Victoria

Good companions of the newly fitted out mess decks, T.S. VOYAGER.

Cadets from Victorian Units learn the art of ropework at H.M.A.S. CERBERUS.

Petty Officer J. McNicol supervises the jackstay transfer T.S. VOYAGER.

At the Champagne Garden Party given by the President of the Victorian Division of the Navy League of Australia. The Ladies' Committee President, Mrs. Rona Hatfield discusses Cadet problems with Commanding Officer [illegible] S. BENDIGO.

JOIN THE AUSTRALIAN SEA CADET CORPS

If you are between the ages of 13 and 18 years

The Australian Sea Cadet Corps is a voluntary organisation administered by the Commonwealth Naval Board and The Navy League of Australia

The aim of the Australian Sea Cadet Corps is to provide for the spiritual, social and educational welfare of boys and to develop in them character, a sense of patriotism, self-reliance, citizenship and discipline.

Uniforms are supplied free of charge.

Cadets are required to produce a certificate from their doctor to confirm they are capable of carrying out the normal duties and activities of the Cadet Corps. If injured while on duty, Cadets are considered for payment of compensation.

Parades are held on Saturday afternoons and certain Units hold an additional parade one night a week.

The interesting syllabus of training covers a wide sphere and includes seamanship, handling of boats under sail and power, navigation, physical training, rifle shooting, signalling, splicing of wire and ropes, general sporting activities and other varied subjects.

Instructional camps are arranged for Sea Cadets in Naval Establishments, and they are also given opportunities, whenever possible, to undertake training at sea in ships of the Royal Australian Navy.

Cadets, if considering a sea career, are given every assistance to join the Royal Australian Navy, the Mercantile Marine or the Royal Australian Naval Reserve, but there is no compulsion to join these Services.

For further information please contact the Divisional Senior Officer in your State, using the Form provided below.

Senior Officers, Australian Sea Cadet Corps

NEW SOUTH WALES: Staff Office Cadets, H.M.A.S. Watson, Watsons Bay, N.S.W., 2030

QUEENSLAND: C/- 39 Pinecroft Street, Camp Hill, Queensland, 4152.

WESTERN AUSTRALIA: C/- 182 Coode St., Como, 6152.

SOUTH AUSTRALIA: C/- Box 1529M, G.P.O., Adelaide, 5001.

VICTORIA: C/- Room 6, 2nd Floor, 528 Collins St., Melbourne, 3000.

AUSTRALIAN CAPITAL TERRITORY: Industry House, National Circuit, Barton, 2600.

NORTHERN TERRITORY: Mrs. V. M. Slide, 12 Allen Street, Fannie Bay, 5788.

TO: The Senior Officer,
Australian Sea Cadet Corps

I am interested in joining the Australian Sea Cadet Corps and would be pleased to receive further information.

NAME.....

STREET..... SUBURB.....

STATE OR TERRITORY..... POST CODE.....

PHONE No..... AGE.....

(Please Print Clearly)

Please address your envelope to the Senior Officer in your State or Territory —see list of addresses above

The Remarkable Airtruk

The world's most efficient agricultural aircraft is made in a modest factr , 20 miles west of Sydney.

By A. WINTERBOTHAM

(The author served in the Royal Navy from 1944 to 1966. From 1948-1958 he flew single seat fighters ranging from Seafires to Seahawks. He is presently Executive Assistant to the Managing Directors of the Group which produces this unique all Australian aircraft.)

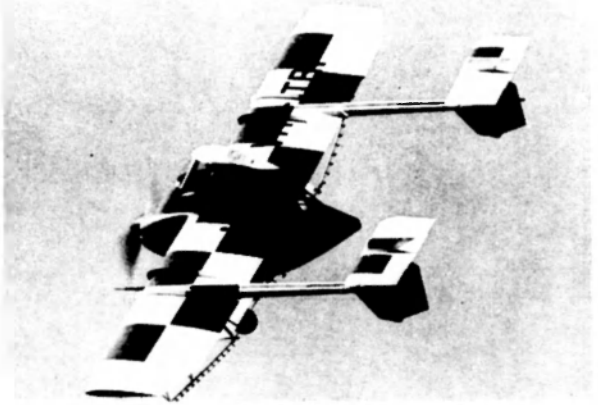
The Airtruk has not yet landed on the deck of H M A S **Melbourne** — but it could, and without the assistance of the arrester wires! This remarkable little aircraft, the only light aeroplane currently being manufactured in Australia lands in 250 feet in still air!

In 1964 an Italian born designer, Luigi Pellarini, called on the directors of a fast growing engineering group with a new approach to agricultural aircraft. His idea was to design an agricultural implement which could also fly rather than a nicely rounded aeroplane which could be adapted for agricultural work. The directors of the Transfield Group were impressed and so Transavia was formed to build and market the Airtruk. In 1966, the first production model came off the line, and since then 38 have been built of which 20 have been exported to New Zealand, Kenya, South Africa and Thailand.

Because of its novel design concept, the Airtruk has many advantages over conventional 'crop dusters' and many unique properties which contribute both to its unusual shape and to its remarkable efficiency.

There are many basic problems facing the designer of an agricultural aircraft. Firstly, how to carry a big payload to ensure an economic operation? It is not enough to produce an aircraft which can spread fertiliser or pesticide from the air. Prices must be competitive with ground spreading techniques and the chemicals must be spread evenly in the right place!

To achieve therefore an operation which gives the farmer what he wants at a good price and still achieve a profit for the operator. There is the rub. Time is vital. The time during which the aircraft is operating must be used as fully as possible in actually spreading or spraying.



The Airtruk's twin booms are kept clear of corrosive chemicals

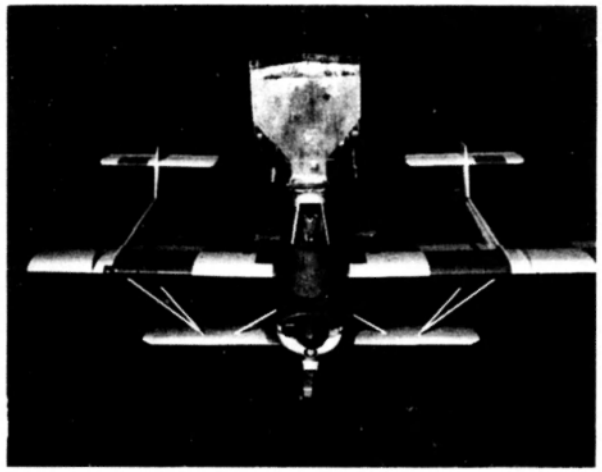
Time spent taxying, circling, manoeuvring or on the ground is wasted. It is therefore logical to argue that the more chemicals an aircraft can carry, the less time is wasted returning for more. But the amount carried depends on the size and power of the aircraft. A one ton load is these days considered to be the most practical maximum. Because it was designed around its hopper, the Airtruk is the only aircraft of its size and power to carry a ton. With its small 300 HP Continental engine, it achieves a remarkable efficiency ratio. Its twin separated booms allow the loading vehicle to drive between them and fill the hopper from above in 15-20 seconds! Most agricultural aircraft are especially manoeuvrable — they have to be: but according to well informed critics the Australian Airtruk out-performs them all and so saves more vital minutes when turning, lining up for runs etc.

Secondly, how to overcome the problems of operating from agricultural airstrips . . .

Any aircraft can operate from Mascot aerodrome, Sydney, with relative abandon, but few can consistently face the rigours of agricultural airstrips and survive . . .

A normal oleo type undercarriage for instance has to be specially strengthened with the consequent penalty in weight. The Airtruk's designer developed a new system of Rhomboid rubber pads, bonded to a hinged steel frame, which replaces the oleo as shock 'absorbers'. When bearing weight or striking an object the trailing legs attaching the wheel to the stub wings swing back, compressing the pads. It is this swing

REMARKABLE AIRTRUK



The loader can supply the Airtruk with 1 ton of chemicals in 20 seconds.

back action which adds an additional safety factor, for the grazier's airstrip can harbour a multitude of stones, chunks of wood, etc., which could cripple a conventional leg. Agricultural aircraft operate at low level with repeated demands on full throttle and often in high temperatures. The danger of overheating is always lurking and one of the features of the Airtruk which operators remark on, is the efficiency of the engine cooling and the resultant reliability. This becomes very important when operating for days from an isolated strip with no repair facilities. An added attraction is the Airtruk's ability to carry two crew members to and from the strip in the rear compartment.

Thirdly, how to overcome the vicious effects of corrosion caused by superphosphates . . .?

Normal aircraft converted to agricultural use drop the chemicals from an orifice somewhere along the fuselage. This very corrosive cloud is carried up and back by the slipstream, coating the after end of the fuselage and causing a dangerous build up of minute particles of "super" inside the tail control surfaces. This build up can, in time, cause control failure. To avoid these problems the Airtruk has twin booms and tail units set well above the chemical cloud. What in fact happens is that the chemicals, falling out of twin orifices (another unique feature), are gathered by the slipstream then by the vortices at the tips of the stub wings and mixed until an extremely even and unusually wide stream of chemicals falls to the ground behind the aircraft. Swath widths of 90 ft. are obtained in this way with an aircraft flying at about 50-100 feet.

Many other problems of a similar nature have been carefully considered. In particular, pilot safety in what are necessarily hazardous flying conditions. To give the Airtruk pilot the best view, he is situated in a high frontal position. Incidentally, when aircraft are spraying as opposed to spreading, they fly literally inches above the top of the crop. Perfect visibility is therefore most desirable. The Airtruk's 'on top' setting also removes him from the 'meat in the sandwich' situation prevalent in other aircraft — between the engine and the load he is liable to be hurt if the aircraft should meet the ground unintentionally. On top, in a steel cage which has withstood static loads of 10,500 lbs., without breaking the windscreen, the pilot has on two occasions walked away from nasty accidents caused by just such a pilot error!

A lot of original thought has gone into the Airtruk concept and analyses by university agronomists in New South Wales and New Zealand have proved beyond doubt that it is more efficient than conventional aircraft. Operators in the field who use the aircraft, have confirmed its economy and even farmers these days have a habit of asking for the Airtruk in preference to other aircraft. It has proved itself in all respects and Australia can be proud that it manufactures the best agricultural aeroplane in the world.

Editor's note:— It would appear that at some future date the Airtruk may be included in the inventory of the armed services. Possibly serve aboard the **Melbourne**, carrying mail, stores and equipment or even be armed. This tiny aircraft certainly presents possibilities. Readers are therefore invited to forward suggestions for publication in the next edition, regarding the possible uses of the Airtruk by the armed services.

The Airtruk in the spray configuration

Singapore's First Warship Completes Trials

R.S.S. INDEPENDENCE, built by Vosper Thornycroft and Singapore's first warship, seen on trials

R.S.S. **Independence**, first of six patrol boats being built by Vosper Thornycroft Limited, for the Maritime Command of the Singapore Armed Forces, has completed her trials and has been shipped out to Singapore. The six craft represent the Government of Singapore's first steps in the setting up of her own force of warships following independence and the withdrawal of the British forces from the Far East. (The six boats are divided into two groups of three known as Type A, and Type B. The Type A vessels will be the first to be completed and will have simpler armament than Type B.)

The vessels are variants of Vosper Thornycroft's 110 ft. design, with diesel engines and steel hulls. The first of each type were built and are being fitted out at Vosper Thornycroft's Portsmouth yards. The four remaining craft are under construction at the Singapore yard of Vosper Thornycroft Uniteers Private Ltd. These patrol boats are more sophisticated than any yet built in Singapore by Vosper Thornycroft Uniteers Private Ltd.

R.S.S. **Independence**, the first boat of Type A (with the simple armament), was launched at the Broad Street, Portsmouth shipyard on 15 July, 1969. R.S.S. **Sovereignty**, first of the Type B vessels, followed on 25 November, 1969. R.S.S. **Freedom**, (the first boat of the series to be built in Singapore) was launched at the Tanjong Rhu yard on the 18 November, 1969, followed by R.S.S. **Justice** in May 1970. The keel of R.S.S. **Peace** was laid on 28 May, 1970.

Both classes have identical hulls of the Vosper Thornycroft 110 ft. design, which is of round-bilge form, with a spray strake and spray-deflecting knuckle extending for more than half the length of the hull. A flat run aft contributes to the high speed potential of this type of hull. Construction is of welded steel, to strict weight limits, with aluminium alloy superstructure.

The hull is divided into five main watertight compartments, plus fore peak and aft peak. In Type A, the first three compartments from forward provide accommodation for the crew of six petty officers, Captain and two officers. Officers and crew share a dining hall, served by a lift from the galley, which is in the superstructure. The machinery space forms the next main compartment, and there is a crew space for 10 men between this and the aft peak. Magazines are fitted into this crew space and into the second main compartment from forward.

The superstructure accommodates an enclosed wheel-house, with chart table and navigation instruments, including Decca Type 626 true motion radar, SAL 24 log, Kelvin Hughes MS 32 F echo-sounder, and Arma Brown gyro compasses. There is an open bridge with alternative steering position at a higher level access from the wheel-house. Also in the superstructure are the galley, air conditioning equipment, and stores.

R.S.S. **Independence** is armed with one 40-mm automatic Bofors gun forward, one 20-mm Oerlikon aft, and a Bofors fire director on the bridge. Two MOD(N) Mark 5 rocket launchers are fitted to the Bofors gun. There is also an outfit of small arms.

Main propulsion machinery consists of two Maybach MD 872 diesel engines each delivering 3600 b.h.p. at the maximum (½ hour) rating, at which the corresponding speed is 32 knots. The engines are on resilient mountings, and drive rigidly mounted reverse-reduction gearboxes through flexible couplings. The gearboxes absorb the shaft thrust. The engines are air started and fresh-water cooled and have underwater exhausts.

Two alternator sets of 48 kW capacity each are driven by Ford diesel engines. These engines also drive, through friction clutches, stand-by bilge pumps and air compressors. They are started electrically. Auxiliary machinery includes Vosper stabilizers, Mathway hand steering gear, and air conditioning to all living and working spaces. Machinery is controlled from the wheelhouse or open bridge, the engine room not being continuously manned.

Electrical supplies are provided at 440-V, 3 phase, 60 Hz; 115-V, 3-phase, 60 Hz, and 24-V d.c. The main electrical switchboard is accommodated in a cubicle in the after part of the engine room.

A full outfit of modern communication equipment is fitted.

R.S.S. INDEPENDENCE

Dimensions

Length overall, 109 ft. 7 ins., 33.40 m.

Length waterline, 103 ft. 7½ ins., 31.46 m.

Beam moulded, 21 ft. 0 ins., 6.40 m.

Depth moulded, 10 ft. 5¼ ins., 3.18 m.

Draft over propellers, 5 ft. 7½ ins., 1.71 m.

Speed and Range

Maximum, ½-hour rating, in excess of 25 knots.

Maximum continuous, in excess of 25 knots.

Range at 15 knots, in excess of 1,000 n. miles.

CANADIAN REPORT

Canadian defence resources and armed forces' expertise faced an unusual collection of adversaries in 1970 — terrorists at home, a Peruvian earthquake, floods in East Pakistan, pollution in Canadian coastal waters.

There were other challenges of a different nature: in Germany, one of the largest peacetime moves in Canadian Forces' history; in the Arctic, a sizeable expansion of military activity and commitment; in Cyprus, new responsibilities for the Canadian U.N. contingent.

In the scientific field, the Defence Research Board developed a new high power gas laser with promising industrial and medical potential; conducted research aimed at making possible greater use of the Gulf of St. Lawrence during the heavy ice season; continued experiments in its shock and blast programme and made new progress in improving Canada's northern surveillance capabilities.

The FLQ crisis carried the Canadian Forces into the centre of Canadian affairs as several thousand troops dropped a protective blanket over Ottawa, Montreal and Quebec City. For the first time in years, Canadians met armed soldiers in the streets, and for most citizens it was a sobering but reassuring sight.

During 1970, from March to October, the strength of the forces declined by 2,250 personnel to approximately 90,000 on their way to a planned strength of 82,000. The Honourable Donald S. Macdonald, who succeeded the Honourable Leo Cadieux as defence minister in September, said during the FLQ crisis that he would undertake a reassessment of forces' manpower in the light of possible future requirements for military aid to the civil power, but that in any event forces' strength would not be reduced beyond the planned ceiling of 82,000.

Meanwhile, new equipment and facilities strengthened the forces in 1970: Four Boeing 707s joined Air Transport Command for long-range troop and equipment carrying operations; the CF5 tactical fighter began operations with Mobile Command in Canada and was being evaluated for service with Canadian forces in Europe. Two 22,000-ton operational support ships joined Maritime Command. The first two hulls of a new class of helicopter destroyer were launched at Quebec shipyards. The department announced construction of hangars and maintenance facilities at four bases in Canada for the operation of 50 tactical transport and utility helicopters and 74 light observation helicopters on order for Mobile Command.

Air Defence Command's CF-101 Voodoo aircraft were being exchanged for the same number of improved USAF F-101s under an agreement signed last spring between Canada and the United States. Under the agreement, Air Defence Command will receive eight additional aircraft. Maritime Command took delivery in November of a Canadian-built submersible for diving and other marine operations.

In Germany last fall, flatcars of Canadian armour rolled south leading 2,800 servicemen and 6,000 dependents from the former Canadian forts in Westphalia to lodgings around Lahr in southern Germany. The servicemen form part of the newly-organised Canadian Forces Europe, Canada's NATO commitment of one mechanized battle group and three fighter squadrons at Lahr and Baden-Soellingen.

Early in 1970, Canada's 600-man U.N. contingent in Cyprus moved from the Kyrenia mountains and the island's north coast into the Nicosia district, where they assumed guard duties along the sensitive "Green Line" separating Greek and Turkish Cypriot strongpoints.

The Peru earthquake hit in early June, and during the initial stages of the relief operation, the five Canadian Forces' Caribous were the only aircraft aside from Peruvian Dakotas which could fly into the worst-hit mountain areas. The Caribous threaded through narrow passes with loads of injured for hospitals in Lima, flashing their landing lights on final approach to alert ambulances of heavy casualties.

There were 12 relief flights of blankets and medicine from Canada to flooded central East Pakistan. The Canadian pilots were familiar with the Asian environment after regular round-the-world flights, and the aircraft even managed to pick up cargoes in Germany for the trip back.

The Forces ran up against other natural adversaries during the year — some intentionally! California's Mojave Desert, the Jamaican jungle, northern Norway, and the Canadian Arctic were some of the exercise areas they sought out to toughen their soldiers.

Of these, the Arctic received most attention. The Forces began this year to rebuild a Canadian military expertise in the north. They started year-round exercises for small groups of soldiers, increased Arctic surveillance, opened a staging detachment for patrol aircraft at Frobisher Bay, held a Maritime exercise in Hudson Bay for the first time in a decade, and brought all these activities under the wing of a new Northern Region Headquarters which will be set up in Yellowknife early in 1971. The Forces are also constructing a bridge over the Ogilvie River, NWT, and building several northern airstrips.

The forces and the Defence Research Board helped in pollution clean-ups, particularly the Chedabucto Bay, N.S. oil spill. In freezing, oil-permeated waters, naval divers pierced the holds of the sunken tanker **Arrow** to pump out thousands of tons of oil which might otherwise have escaped into the sea.

During the summer the regular forces and the militia combined to provide approximately 14,000 students and other young people with military training or casual jobs as part of the federal summer employment program for youth.

Canadian Forces Training Command in 1970 pioneered a new method for teaching electronics, called POET — Performance-Oriented Electronic Training — which has stirred interest in both industrial and educational circles. And in addition to fulfilling their function as teachers and instructors for Canadian servicemen, Training Command personnel found time to raise money for, and to construct, a six-room school for children of the Volta River district of Ghana.

And throughout the year the Canadian forces continued to fulfil their commitments to continental air defence, NATO in Europe and on the Atlantic, and to the U.N. in Cyprus, Palestine, Korea, India and Pakistan.

And there were the 2.4 searches, rescues or mercy flights which, the Canadian Forces directs in Canada every day.

Letter to the Editor

7 Joyce Street,
ELWOOD. 3184.
15 April. 1971.

The Editor,
"THE NAVY"
Dear Sir,

None of the journals or other news media which published the news of Sir Victor Smith's promotion to Admiral made any reference to him being the first Royal Australian Navy officer to attain that high rank.

Previously, only two officers of that rank had served with the R.A.N., but they were Royal Navy officers, viz.: the late Admiral Sir Ragnar Colvin and the late Admiral Sir Louis Hamilton.

One feels that greater publicity should have been given to that notable feature of Sir Victor's career.

Yours faithfully,
(Sgd.) R. S. VEALE,
Commander R.A.N.V.R.,
Retired

The Cutting of . . . . . .

"RUSTY RAZOR"

By Peter Brazier

During April/May of this year a small fleet of Royal Navy frigates, minelayers, minesweepers and minehunters from Britain have been taking part, with seven other countries, in a NATO exercise in the Atlantic to the west and north of the Iberian peninsula.

Part of a developing series of NATO maritime exercises designed to strengthen the seaward defences of Western Europe, it includes naval units from the United States, Canada, Belgium, Federal Germany, the Netherlands, Portugal and France and has been code-named "Rusty Razor".

But it is a name inappropriate to the cutting edge of modern British naval power — and the NATO sea defence force of which is plays such an important part.

For Britain continues to attach paramount importance to its NATO force contribution — particularly the naval contingent. As Under-Secretary of State for Defence for the Royal Navy, Peter Kirk stressed in a House of Commons debate: "The Royal Navy has a unique contribution to make to the Alliance".

Worldwide Ability

The decision to retain the aircraft carrier **Ark Royal**, for instance, will add to that contribution and the future through-deck carriers with their hard hitting anti-submarine capability will also play a vital role.

For in the current Whitehall view it is essential to have the ability to meet at all levels — and worldwide if necessary — any threat to trade highways

It is accepted that no positive military threat exists at present but Britain's navy chiefs, planning ahead in case one should arise, are watching carefully, for example, the increasing presence of Soviet warships in the Indian Ocean. As Mr. Kirk said: "We must be equally ready to demonstrate our presence and ability to defend with our Allies our rights of free passage and to provide assistance to our friends if necessary".

The Buccaneer is a 2-seat naval strike aircraft with nuclear capability as well as conventional bombs and rockets. The aircraft is powered by 2 Rolls-Royce Spey Turbojets and is shown here being catapulted from H.M.S. ARK ROYAL.

For the peacetime role of the Royal Navy spreads its influnce far beyond the shores of Britain. Apart from protecting British shipping and fishing interests, maintaining patrols and training, the Navy is always ready to help in humanitarian and emergency tasks whenever and wherever they arise.

Safer Seas

A good example was the flood disaster in East Pakistan last year when the Navy was able to provide relief in a big way. Another was the surveying last month of an alternative route in the English Channel to allow shipping to avoid the hazard caused by recent wrecks.

In fact the continuing work of the Royal Navy in hydrography and surveying generally makes a big contribution to safety at sea.

Economy measures over the past few years have tended to leave the impression in some quarters of a weakening in British sea power. Nothing could be further from the truth.

Britain is the biggest naval power in Western Europe today, and Mr. Kirk gave members of Parliament some facts and figures to prove it.

The strength of the British fleet at present is 200 vessels, the majority of which are significant fighting units. Current defence policy aims at maintaining that strength. A number of frigates due to be phased out in the next year or so are being kept in commission to step up Britain's NATO contribution and maintain an enhanced presence East of Suez.

And future fleet plans will bring into service ships with new weapons providing greater fire power and needing fewer men to man them.

VTOL Aircraft

The frigates in Britain's **new look** Navy will be complemented with guided missile destroyers armed with **Sea Dart** surface-to-air missiles and carriers with Sea King helicopters, to provide a significant anti-submarine capability. The carriers will also be able to operate vertical take-off and landing air support planes if a decision is taken to deploy aircraft of this type at sea.

Results of this programme are already beginning to emerge. Princess Anne launched one of the new frigates recently and three more are planned. One of the new guided missile destroyers is expected to be launched shortly and tenders for four more are being examined.

And for the future? Design work on the new cruisers is well advanced and planning is also in hand for a new class of mine counter-measure vessel which will use glass reinforced plastic in the hull construction.

All these ideas for improving and streamlining the Royal Navy to meet the challenges of the '70s are geared to Britain's new defence policy as outlined by Defence Secretary Lord Carrington "to enable Britain to resume, within her resources, a proper share of responsibility for the preservation of peace and stability in the world".

THE WORKS — ANZAC DAY '71

CODE — INDEED . — — . . — . . — . .
— . . — — — . .

By Vic Burley

Sound the Still—Now cast your mind back — Think, two simple words Well Done — 'Tis the Navy's highest tribute — in this year of Seventy One — flags at half mast — Last Post sounding — in reverence — heads we bare — from the smallest — outback township — to the silenced city square, ex-service, — We Remember — defeat — and victory — fear of blokes — and comrades absent — our mates or yesteryear — but this sunburnt land — this still is ours — though raw and rough she teaches from Kosciusko's snow-capped peaks — to her wide and surf-swept beaches — the Merino sheep in springtime — the metallic bell birds' song — her mineral wealth — her blue gums tall — a quiet billabong — the Southern Cross — our emblem — whilst dingos taunt the moon — the Poinciana — scarlet — the Jacarandas bloom—where a man's a man — for what he is — no matter what his breed — his colour — nor his country — his kith nor kin, nor creed — though a continent, — an island, — a fact, — and still makes sense — then our Navy is our bastion — our attack — and last defence — no time for livin' in the past — for time — like tide — must change — and ships' design — and modern lads — shows missiles well in range — so forget not — we ex-service men — and the price we had to pay —our youth — out blood and toil — for this freedom — yours — today — whilst the world — once more in turmoil— as protests — and marches show, and you're free to shout—to act—or speak—with the rights — to 'ave a go — watch us old men — medals gleaming — we show age — but no regret — so — well done, — stand fast, — or carry on, — my God, — Lest We Forget.

Now think — these words — Fair — dinkum —

AVE A GO — is what we teach — Then, it's up to you — the younger set — to practice what you preach with these road deaths — ever mounting — your constant watch demands — the time — to think — no extra drink but the future's in your hands

Amen.

Another Ferranti Trainer For The Royal Navy

A new trainer system is to be designed and built for the Royal Navy by Ferranti Limited in close collaboration with the Admiralty Surface Weapons Establishment at Portsdown. The trainer will be commissioned at H.M.S. **DRYAD**, the Royal Navy's School of Tactics, Navigation and Action Information Organisation during 1975, at a cost approaching 5 million Pounds.

The function of the new system will be to train command and operation room teams of the future fleet in using automated action information and weapon control equipment. It will simulate the operations rooms and the weapon control systems of: The Leander class frigates fitted with the IKARA anti-submarine guided missiles, the new type-42 guided-missile destroyer and the Leander class frigates equipped with Computer Assisted Action Information Systems (CAAIS). In addition the trainer will drive an existing operations room simulator of a standard Leander class frigate.

The new trainer will contain a centralised computer complex comprising three FM. 1600 and eight FM. 1600B micro-circuit processors. These computers will generate, process and distribute data to displays in the control and operation rooms of the trainer. The four simulated operations rooms — known as 'models' — are replicas of the ships' operations rooms they represent. Radar, sonar, electronic warfare and weapon control data are presented on the same displays and in the same form as under operational conditions.

Instead of live signals being used, the data will be synthetically generated. In general these synthetic signals will be programmed computer outputs, but for one of the more complex radars Marconi Ltd. are to supply special equipment for this purpose.

Exercises will be controlled by the instructional staff in a central control room containing sixteen displays. Each of the simulated ships will be able to exercise independently or as a task force using radio and digital data-links for exchange of information. Communication with the computer complex is by means of keyboards.

The ships simulated by the trainer, apart from the standard Leander, are themselves equipped with Ferranti systems for action information and weapon control. The new type-42 guided-missile destroyer is equipped with a Ferranti designed and built Action Data Automation System which will also be fitted in the type-42 destroyer recently ordered by the Argentine Navy. The equipments in the new Leander frigates are derivations of Ferranti ADA systems.

This will be the second major naval trainer for H.M.S. **DRYAD**. The first, opened by Admiral Sir Horace Law, C-in-C Naval Home Command in June 1970, comprises a 20-cubicle computer-controlled Action Speed Tactical Trainer and an Operations Room Simulator of a County class guided-missile destroyer fitted with Action Data Automation (ADA).

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