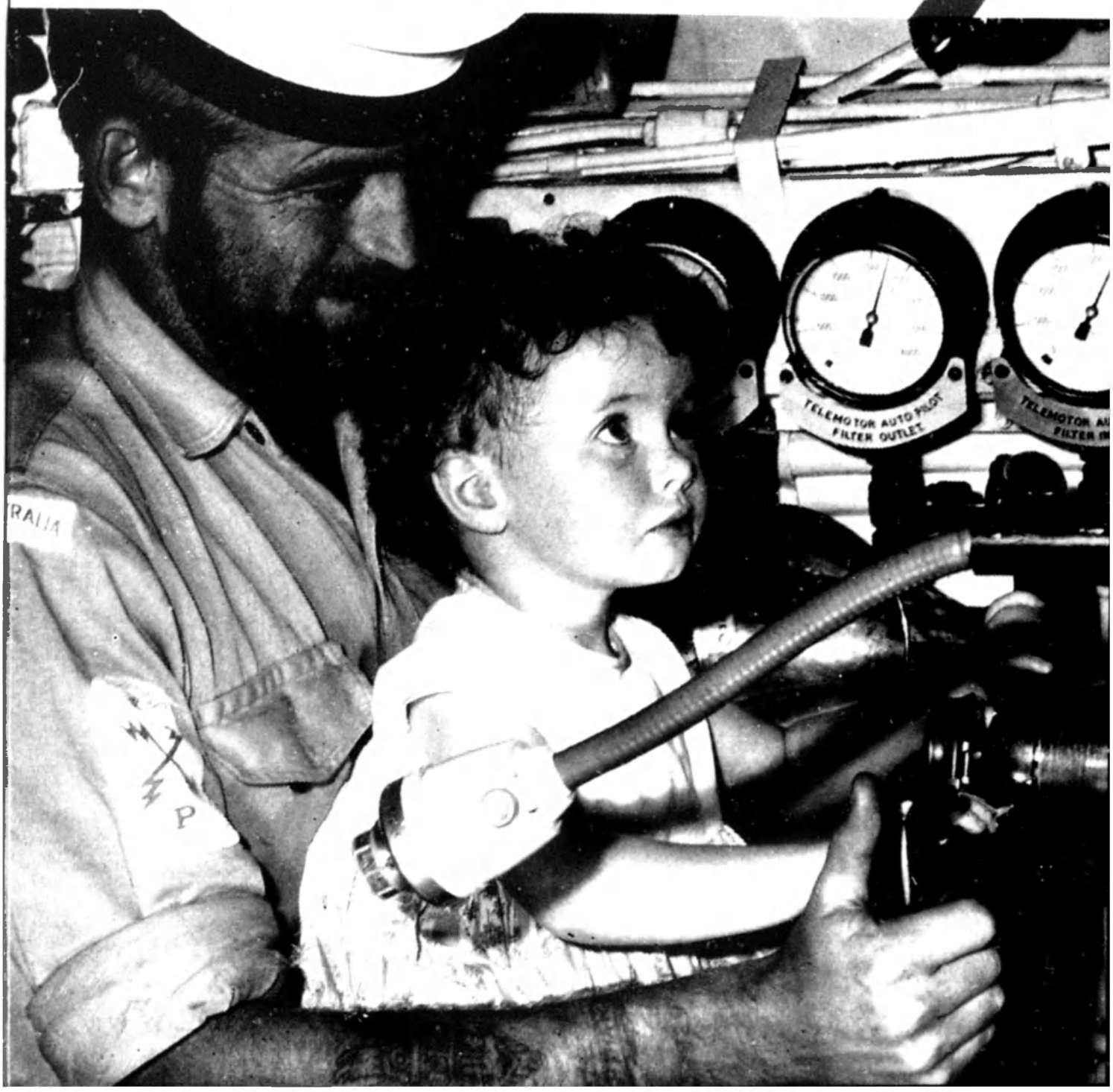
February, March, April, 1968

Registered in Australia for Transmission by Post as a Periodical

15 cents

THE Navy



THE NAVY

The magazine of the Navy League of Australia

(Registered in Australia for transmission by post as a Periodical)

Vol. 30 **FEBRUARY-MARCH-APRIL, 1968** **No. 1**

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The views expressed in articles appearing in this publication are those of the authors concerned They do not necessarily represent the views of the editor, the Navy League, or official opinions or policy

Published by the Navy League of Australia, 66 Clarence Street, Sydney, N.S.W., 2000; Tel.: 29-6531
Postal Address: Box 1719, G.P.O., Sydney, N.S.W., 2001

EDITOR: Dennis P. Trickett, Esq., Box C178, Clarence Street Post Office, Sydney, N.S.W., 2000, Australia.

ADVERTISING AND PUBLICATION: PERCIVAL PUBLISHING CO. PTY. LTD.

SYDNEY	MELBOURNE	ADELAIDE	BRISBANE	PERTH	HOBART
108 Henderson Rd. Alexandria, 2015 Phone: 69-6231	17 Elizabeth St Melbourne, 3000 Phone: 62-6411	17 Currie St. Adelaide, 5000 Phone: 51-6225	546 Queen St. Brisbane, 4000 Phone: 31-2531	63 St. George s Tce Perth, 6000 Phone: 23-2031	152 Collins St. Hobart, 7000 Phone: 23-732

THE NAVY LEAGUE OF AUSTRALIA

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Diving in the Royal Australian Navy

By LAURENCE MATHESON

The selection of an Australian Naval officer to join the U.S. aquanaut programme, is the latest distinction accorded the Clearance Diving Branch of the R.A.N., at 16, one of the youngest branches of our modern navy.

Although short in years, the branch is long in experience and tradition.

There are many ancient records of diving exploits connected with Naval warfare; Scyllis, employed by Xerxes to recover sunken Persian treasure; Alexander the Great's use of divers to destroy the boom defences of Tyre in 333 BC. Divers were used in at least six naval battles between 400 BC and 1795 AD, and in the early 1800's Spanish warships carried men for diving duties, although no equipment was carried

In his famous treaties on warfare, written about 375 AD, Vegetius described diving hoods equipped with airpipes and even earlier, Pliny, about 75 AD, referred to military divers who breathed through tubes supported at the surface by a float.

Until recently, diving in the Royal Australian Navy had been closely tied to developments in the Royal Navy.

In 1939, the Royal Australian Navy employed standard divers throughout the Fleet. Their equipment — helmet, corselet, boots and waterproof suit — was clumsy, and their dependance on surface air supplies limited their range.

Training was carried out initially at H.M.A.S. CERBERUS, Westernport, Victoria, but was later transferred to Chowder Bay, Sydney, where the Diving School remained until 1948.

World War II revolutionised the techniques of diving.

The breakthrough came when the body of an Italian diver was washed ashore following the sinking of three British Merchant ships at Gibraltar in November, 1941. The body was wearing a new type of self-contained breathing apparatus which allowed considerable freedom of movement and endurance.

The equipment was flown to England where, within two days, scientists modified the existing British set.

This provided the underwater working parties of the Royal Navy with equipment to carry out demolition work, beach surveys and attacks on enemy shipping and harbour installations.

The exploits of these divers have become almost legendary. The frogmen, as they were called, included many Australians, including Commander M. S. Batterham, O.B.E., R.A.N.R., and Lieutenant L. V. Goldsworthy, G.C., D.S.C.,

Alert and determined—Navy Clearance Divers prepare to enter the water.

G.M. and Bar., R.A.N.V.R.

From Cherbourg to Kiel and beyond, following the Normandy invasion, underwater working parties, searched in excess of 20 million square feet, mostly in zero visibility, during some 600 days of diving.

They destroyed 209 mines, 121 demolition charges and booby traps, a VI rocket, 8 torpedoes, 3 explosive-filled motor boats and 7 midget submarines.

In the Pacific, Australian divers destroyed thousands of tons of captured Japanese explosives, mines and ordnance. Even now, more than 20 years after the war, mines are occasionally washed ashore and are rendered safe by Navy divers.

Limited wars and local conflicts since World War II forced the reintroduction of diving teams to combat underwater attacks — as in Suez in 1956, Cyprus in 1958, Malaysia during confrontation, and now in Vietnam. This is the job of the Clearance Diving Branch which was formed in 1951 with underwater bomb and mine clearance as its major task. New equipment was introduced and many new techniques perfected.

Today, the Navy Diving School at Rushcutters Bay, includes a School of Underwater Medicine which is responsible for studies in various fields of medicine, and research connected with diving.

The causes of nitrogen narcosis (rapture of the deep), decompression sickness (divers' bends) and the phenomenon of oxygen poisoning are only some of the matters which concern the highly-qualified staff.

The School's hyperbaric chamber, which can simulate depths up to 300 feet, is used extensively in the selection of diving and submarine service trainees. It is also available for use in a civil emergency.

Recently, Navy clearance diving teams distinguished themselves in Vietnam, where they are responsible for the destruction of Vietcong mines and booby traps both on land and in the sea. More recently, Navy divers under Lieutenant Mike Shotter played a prominent part in the search at Portsea for the body of the late Prime Minister of Australia.

The quality of training at H.M.A.S. RUSHCUTTER is internationally known and, in some respects, R.A.N. divers lead the world. Foreign countries such as Malaysia regularly send their divers here for training and R.A.N. Officers have been posted overseas to assist in the formation of diving teams.

The inclusion of an Australian aquanaut in the Sealab series is both a compliment to the R.A.N. and an international acknowledgement of its diving skill.

FIRST R.A.N. AQUANAUT

The Royal Australian Navy has been invited to send an R.A.N. clearance diver to take part in the U.S. Navy's aquanaut programme.

Lieutenant Michael Shotter, 31, left for the U.S. on 29 January to take part in the U.S.N.'s Project Sea Lab III which will be conducted in waters off the coast of San Clemente Island, California, later this year.

Lieutenant Shotter will join five teams of eight divers who will live in an ocean bottom habitat for 12-day periods at a depth of about 600 feet.

The Royal Navy and the Royal Canadian Navy have also been invited to send divers to take part in the programme which has hitherto been restricted to U.S. personnel.

The programme's objective is to provide a capability for support of rescue and salvage operations, maintenance of bottomed equipment, exploration and exploitation of the continental shelf.

Sea Lab III will continue for the group of selected aquanauts for about eight months.

It will be the third phase in the U.S. project.

Sealab I took place off Bermuda in July, 1964, when four men lived for 10 days in a large cylindrical chamber 192 feet below the surface.

In 1965, during a 45-day programme, three teams of ten men each spent 15 days underwater in a 57 ft. by 12 ft. cabin submerged in 205 ft. of water at La Jolla, California. (During this experiment, the astronaut Scott Carpenter stayed for 30 consecutive days in the cabin.)

The acquanauts salvaged an aeroplane hulk, did biological and oceanographic research and conducted psychological and psyiological tests.

Lieutenant Michael Shotter, R.A.N.

H.M.A.S. OXLEY
— THE STRONG, SILENT TYPE

From the outside, H.M.A.S. OXLEY doesn't look much different from any other submarine. The shape is familiar — long, low, black, sleek and streamlined.

From outside there is not much to see — it is inside the hull, beneath the steel and fibreglass, that lie the innovations that make this submarine different from her predecessors.

OXLEY is an improved version of the OBERON-class submarine, costing approx. $A10 million each.

Within her 295½ ft. overall length, is machinery, weapons and electronics which combine to make her one of the most effective conventional types of submarine in the world.

Her modern armament, communications equipment, impressive capabilities and general complexity seem to belie the word "conventional", but to the submariner the word merely indicates she is non-nuclear. And as a conventional submarine OXLEY has special and important traits. These include silent operation. She is capable of moving through unfriendly waters undetected, perhaps remaining submerged for many weeks at a time if necessary.

And she is able to listen with her sonars, quietly gathering accurate information on the movements of other shipping.

If required, she can act — her newly-developed electronic fire control system and her eight torpedo tubes giving her a deadly sting.

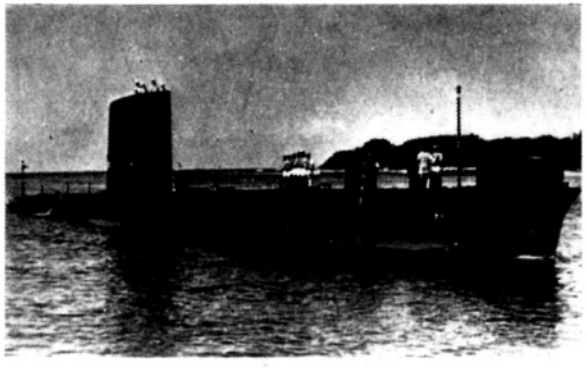
Her peace-time function will be to provide anti-submarine training for the Royal Australian Navy and Royal Australian Air Force for which, because of her own elusiveness, she will be invaluable; but she is well equipped to play an offensive operational role should the need arise.

NEWEST SHIP HAS LINKS WITH PAST

OXLEY, the newest ship in the Australian Fleet, was built in the world's oldest shipbuilding yard — Scott's Shipbuilding and Engineering Co. of Greenock, Scotland.

Though Scott's is the oldest shipyard in the world, the most modern techniques, including unit prefabrication, were used to build OXLEY.

Unit construction allowed the ship to be built in sections giving maximum control of all phases of the work, and enabling critical testing of the pressure hull by ultra-sonic and X-ray checking.



H.M.A.S. OXLEY entering harbour.

COMPACT LIVING

Submarines are noted for their compactness, and OXLEY is no exception, though nearly 300 ft. long.

Within her confines are packed machinery, equipment, torpedoes and stores. She carries a crew of 61 men.

There is not a great deal of spare room. Everything is tailored to fit — and in a submarine weight distribution is an important consideration.

Yet, to those who have known submarines in the past, OXLEY is luxurious, she has full air conditioning, bathrooms, a compact but fully equipped galley and even piped music.

In the words of the naval architects she has the "highest possible degree of habitability", an important consideration for men who have to live, eat and sleep for long periods in a confined area, and it extends to such things as colour planning and the selection of harmonious patterns in the decor.

The attention to detail in planning the layout of the submarine is appreciated by the sailors . . . such things as the planning of bunks and lighting so that those sleeping are not disturbed by those on another watch.

For recreation there is a library, a movie projector and a tape recorder.

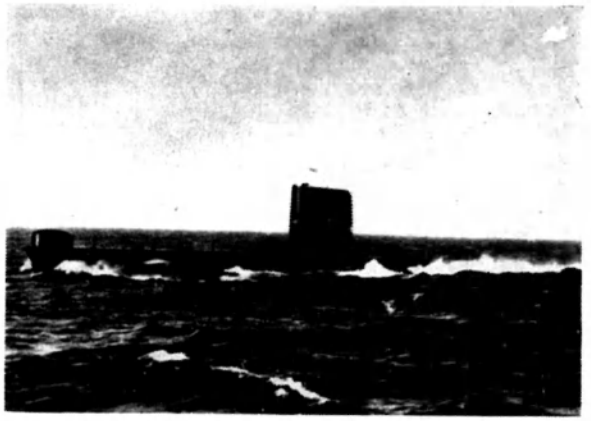
FIGHTING CAPABILITY

OXLEY is designed to do more than offer comfortable quarters to her ship's company, of course.

She is primarily a fighting ship with great aggressive potential.

She is capable of high speeds submerged and can dive below 400 feet. She has the endurance for long voyages and can stay submerged for weeks if needed.

Two large electric motors drive the submarine's propellers. These



H.M.A.S. OXLEY submerging. The latest version of the Oberon-class patrol submarine, OXLEY is one of the most advanced submarines of her type in the world. Specially designed for silent running, her equipment includes the most sensitive underwater listening apparatus and a new electronic fire control system.

are supplied with electricity from two large storage batteries which are charged by two diesel generators.

OXLEY generates enough electricity to serve the needs of a small town.

Her impressive firepower comes from eight. 21 inch torpedo tubes — six bow and two stern. She is capable of firing various types of torpedo including electrically propelled homing torpedoes.

She can attack both ships and other submarines.

THE MEN OF OXLEY

Man for man OXLEY'S ships company is the best trained in the Royal Australian Navy.

Every officer and sailor was fully qualified to serve in surface ships before being hand-picked for submarine service. No sailor had a rank below able seaman. Many of OXLEY's complement have served in Britain or in British submarines for almost four years and all but one or two have had at least two years submarine experience.

Because a submarine officer must serve as a first lieutenant for a period of anything between two and five years before getting his own command, Australia has invited British submarine officers to join the R.A.N.

One officer to accept the offer is Lieutenant Commander David Lorrimer, a Royal Navy submariner since 1950, and now captain of H.M.A.S. OXLEY.

Lieutenant Commander Lorrimer (see photograph) served in Australia as captain of H.M.S. TAPIR in 1961-62. He has a wife and four children and a home in Sydney.

OXLEY IN AUSTRALIA

OXLEY's arrival in Australia marks the opening of a new chapter in the Royal Australian Navy's submarine service.

Australia's first submarine for 36 years will be followed by three more — H.M.A. Submarines OTWAY, OVENS and ONSLOW —now being built by Scotts, and all four boats should be handed over to the R.A.N. by the end of 1969.

While they are building, their crews are training. A total of 22 officers and 247 sailors have been chosen for submarine service.

Australia's new submarine force will add further strength and versatility to the growing Royal Australian Navy.

OXLEY and the other submarines being built will be based at the new submarine support facility, H.M.A.S. PLATYPUS, Neutral Bay, Sydney.

Captain of H.M.A.S. OXLEY is Lt. Cdr. D. H. Lorrimer, a former R.N. officer. He joined the R.A.N. from the R.N. in January 1967 and now has his home in Sydney. Lt. Cdr. Lorrimer served in H.M. submarines from 1950 and commanded H.M. Submarine TAPIR during 1961 and 1962 when she was serving with the Fourth Submarine Division in Sydney.

NAVY LEAGUE INSPECTION OF H.M.A.S. OXLEY

During the afternoon of Sunday, 7 January, about 40 Fellows of the New South Wales Division of the Navy League of Australia were privileged to visit H.M.A.S. OXLEY.

The comprehensive inspection was conducted by Lieutenant Commander L. J. Dennis, R.A.N.

Something of interest has caught the attention of Lt. Commander L. J. Dennis, R.A.N., and Rear Admiral H. A. Showers, C.B.E., Federal President of the Navy League of Australia, during the League's inspection of H.M.A.S. OXLEY.

Pictured by the R.A.N. photographer in the forward torpedo compartment A.B. McKeown answers questions fired at him by younger members of the Navy League of Australia (L. to R.): Lt. Stephen Scarlett, R.A.N., Miss J. A. McCauley, Miss Pam Lambert, Mr. Robert M. Ward, Miss Joan Marshall, and Mr. Keith R. C. Colley.

"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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Sir,

I am desirous of becoming a Fellow 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.

Doppler Radar and Meteorology

by DR. K. R. BROWNING

Meteorological Office Research Unit, Royal Radar Establishment

Ever since the early users of radar found to their dismay that radarscopes were cluttered with echoes from natural targets, meteorologists have been exploiting radar in an increasing number of ways, both as a research tool and as a short term forecasting aid. Conventional incoherent weather radars are now well-established as operational tools. Doppler radar, on the other hand, is presently being used by meteorologists mainly for research; however, several possible operational applications can be foreseen in the near future.

The amount of radar energy back-scattered from cloud droplets and other natural targets is strongly dependent upon the diameter of the targets, so that radars operating in the wave-length range of 3 to 10 cm most commonly used by meteorologists generally fail to detect clouds until particles within them have grown big enough to fall out.

As a result, radar can be used to locate the horizontal and vertical extent of regions of rain and snow. With some limitations the intensity of the radar echoes can provide a useful measure of rainfall intensity. Precipitation patterns associated with severe storms such as hurricanes and tornadoes often show such characteristic signatures that they can be identified and tracked remotely by radar. For these and other reasons radar has become a well-established meteorological tool.

While meteorologists are quite familiar with the use of conventional radar, it is only in the last decade that they have begun to apply Doppler radar techniques. The Doppler frequency shift (the frequency changes because the target is moving) of the back-scattered radar energy is of course a measure of the line-of-sight speed of the targets. In the conventional, or incoherent radar this information is lost; however, in Doppler, or coherent radar, the frequency of the transmitted radiation is held in memory and is "beat" with the back-scattered energy to obtain the Doppler shift — the difference between the two. Some early Doppler radars used by meteorologists were of the continuous wave (CW) kind and did not permit the range of the target to be resolved. Nowadays it is mainly pulsed Doppler radar that is used. Apart from its velocity

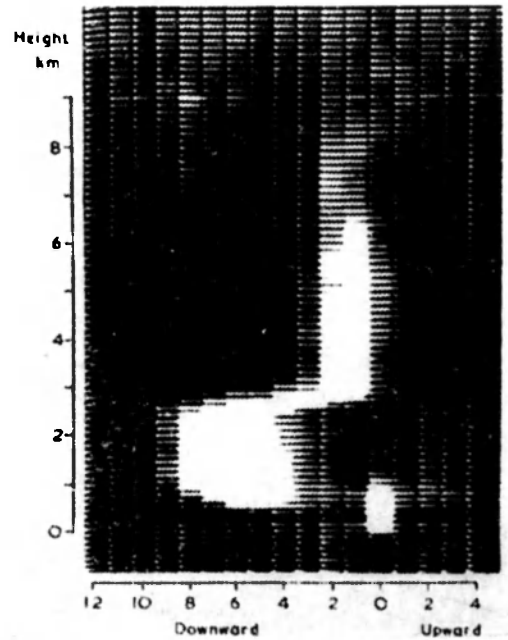


Figure 1.—Photograph of a range-velocity display, obtained with a Doppler Radar looking vertically in widespread rain. Each row corresponds to a height interval of 150m, each column to a velocity band of 1 m/s. The echo from targets in each height interval and velocity band is summed and presented as intensity modulation. In this example, the 0° c. level is just below 3 km, with snow above and rain below. The disappearance of echo below 450m is due to receiver paralysis, and the strong signal in the zero velocity channel below 1km is due to break-through of the transmitter pulse and to ground reflections from side lobes. (Photograph by Dr. P. Caton, Meteorological Research Unit, Royal Radar Establishment.)

measuring capability the pulsed Doppler radar is not very different from conventional weather radar. However, because of the paramount importance of atmospheric motions to the meteorologist it has found many new applications. Its chief limitations are, first, that it measures a component of velocity toward the radar, and not necessarily the actual velocity of the targets and, second, that it measures the velocity of targets which have a finite speed of fall relative to the air, and not directly the air velocity itself. The art of using Doppler radar in meteorology lies in untangling the different contributions to the measured radial velocities. Three observational modes are in common use: vertical, horizontal and conical scans. Some applications are outlined in this article, which is restricted to ground-based equipment.

In the vertical mode the radar beam, usually about one degree wide, is pointed vertically, and the vertical velocity and reflectivity of targets within the beam are measured at different heights up it across about 100 metres. In some radars a number of these slices can be investigated simultaneously, while in others they are investigated sequentially. In this way a time history can be obtained of the vertical speeds of targets at different altitudes as they drift through the radar beam.

If the targets are snowflakes, for which the terminal speed of fall rarely departs much from 1 m/s, the vertical air motion can be estimated by subtracting 1 m/s from the measured velocities. Sometimes, however, the vertical air motions in snow are much smaller than 1 m/s and a more elaborate technique involving conical scanning has to be used.

Variations in time of the mean vertical air motion inside a single section of the beam provide a measure of the turbulent energy in scales bigger than those sampled. Instantaneous differences in speed inside the sampled volume, which can be obtained from ordinary radar, constitute a measure of the turbulent energy in smaller scales. (Fortunately variations due to differences in terminal fallspeed of the snowflakes themselves are generally small compared with those caused by turbulence.)

Snowflakes melt into raindrops as they fall below the 0° C. level. The transition zone is clearly evident from the sudden increase in particle fallspeed (Figures 1 and 2), and also from a temporary increase in reflectivity as the snowflakes begin to melt (the so-called radar bright-band effect). Rain drops fall at widely different speeds, ranging on some occasions from 1 m/s for the smallest detectable drops to 8 m/s for the largest stable drops. In some convective clouds the presence of hail is associated with even larger fallspeeds. Vertical air motion will of course produce a shift in the entire spectrum.

In practice, variations in terminal fallspeed and updraught velocity are distinguished by assuming that the minimum-fallspeed end of the spectrum comes from particles with a terminal fallspeed of 1 m/s and that the entire spectrum is shifted by a constant amount due to a uniform updraught velocity. Of course, errors arise when such small particles are not detected or when there is a large spread of vertical air velocity within the sampled volume at any instant.

When the radar beam is pointed vertically in widespread rain, in which the vertical air motion and turbulence are relatively small, the spectrum of received echo power as a function of velocity (the so-called Doppler spectrum) is determined completely by the speed of the falling drops. As the terminal fallspeed and ability to reflect radar energy of rain drops are related to their size it becomes an easy matter to compute the drop size distribution. Knowledge of this is important for an understanding of precipitation.

A radar beam can also be directed either horizontally, or at such a small elevation angle that any effect of the fallspeed of targets toward the radar can be ignored. In one application the radial component of the horizontal velocity of precipitation particles is measured at a number of ranges and at regular azimuth intervals during the passage of a nearby rain or snow shower. As the shower passes by, given parts of it are observed from different directions. Assuming that the shower maintains a more or less steady state during the short period of observation, it is possible to combine the measured velocity components to give the low level field of horizontal air motion beneath the shower.

A particularly important potential application of Dopper radar is in the detection of tornadoes, which in some countries represent a major hazard to life and property. Tornadoes are usually spawned beneath the updraughts of severe local storms, and are characterised by a circular wind field with strong tangential winds sometimes exceeding a speed of 100 m/s. Provided that a tornado contains radar-detectable targets (debris or precipitation), it should be possible to detect its circulation using Doppler radar in the horizontal mode. This has been done once successfully using a continuous wave Doppler radar. Although pulse Doppler is superior because it gives a higher peak power and also range information, there are limits to the speeds and ranges that can be measured completely unambiguously. The highest speed is directly proportional to the radar's pulse repetition frequency (PRF) while the maximum range is inversely proportional to it. So the choice of PRF has to be a compromise between versatility in velocity or in range. For a 3 cm. wavelength radar, a velocity of 50 (25) m/s can be measured unambiguously only out to a range of about 23 (46) km.

A technique that is useful in the presence of widespread precipitation is the conical scan, in which the beam is kept at a fixed elevation angle and is rotated slowly in azimuth. Radial velocity is measured at different ranges, each scan following a circular path at a constant altitude. In a uniform wind field the azimuthal variation of the radial velocity component is sinusoidal; it is a maximum (minimum) in the up (down) wind direction and is zero in the crosswind direction. In the usual situation of a non-uniform wind field, mean wind speed and direction can be obtained from the measurements. So

can the deformation (i.e. the rate at which the airflow would deform a horizontally orientated square into an oblong). Finally, after correcting for the component of velocity toward the radar due to the precipitation fallspeed the horizontal convergence of air into the scanned circle can be found, too. The vertical air velocity at any given level may then be computed by vertically integrating the convergence at all lower levels. This is the technique that must be used to measure widespread vertical velocities of the order of tens of cm/s which are too small to be detected directly by using the vertical method.

These are some of the uses to which meteorologists have put Doppler radar. As a rule precipitation particles are the targets and they are used to tell us something either about the nature of the particles themselves or about the motion of the air in which they are embedded. However, clear air targets, such as insects, are also detected by Doppler radar. Observations of clear air targets using the conical technique have recently been found to provide quite accurate profiles of the wind in the lowest few thousand feet of the atmosphere.

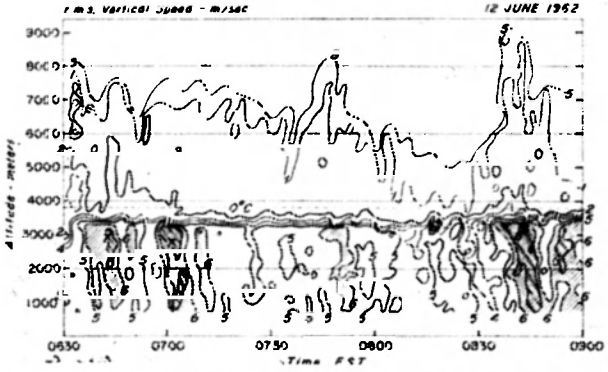


Figure 2.—Height-time diagram of the root-mean-square particle fallspeed obtained using a Doppler Radar looking vertically in fairly steady precipitation. Contours are at 1 m/s intervals, except 0.5 m/s for the uppermost contour. The 0°c. level is at 3800 m. Notice the sharp vertical gradient in fallspeed where the snowflakes melt into raindrops. (Diagram by Drs. R. M. Lhermitte and D. Atlas, Air Force Cambridge Research Laboratories, Massachusetts, U.S.A.

More Punch for Navy Guns?

The Royal Australian Navy is intensely interested in U.S. Navy developments which could greatly add to the punch of existing naval guns.

The new techniques involve revolutionary changes to naval ammunition — but few changes to expensive capital items such as guns. If adopted by the R.A.N. they will immediately raise the question of establishing new manufacturing capacity in Australia or becoming even more dependent on U.S. sources of supply.

In broad terms, the changes involve the inclusion of rocket propulsion in standard Navy shells. After being fired, the rocket on the end of the shell ignites, giving added thrust and range.

Eventually, it is conceivable that such rocket-assisted projectiles (RAP's) could even engage in mid-course manoeuvres.

The technique offers the possibility of combining the advantages of existing artillery with those of rocketry. At the same time, the cost element of rocketry could be greatly reduced.

In the case of the standard five-inch guns used on U.S. Navy destroyers (identical to those with which Australia's three U.S.-built guided missile destroyers are equipped) the RAP will add about 30 per cent — three to five miles — to its range.

This is of vital importance in the case of shore bombardment operations, such as both the R.A.N. and the U.S.N. are undertaking in Vietnam because it could take the ships outside the range of shore-based guns (at least until similar ammunition is developed for land artillery).

According to the "Wall Street Journal", the first generation of rocket-assisted projectiles will soon be in production for the U.S.N.

The newspaper says there is a new trend in U.S. naval technology toward trying to bring existing weapons up to date rather than to proceed further on the outer fringes of missilry.

It quotes Admiral Arthur R. Gralla, Commander of Naval Ordnance Systems Command, as saying:

"For all the millions spent since World War II and Korea on very sophisticated weapons, we haven't fired any Polaris missiles, we haven't fired any of the three T's (Talos, Terrier and Tartar anti-aircraft missiles). But we are firing thousands of old, fired bullets."

The new RAP shells developed extend the reach of a five-inch gun with a 190 in. barrel to nearly 14 miles from the present 11 miles. The five-incher with the 270 in. barrel will have a range of more than 19 miles compared with 14 miles at present.

Work is already proceeding on a second generation of RAP shells under "Project Gunfighter". Experimentally, some shells developed in this programme have travelled more than 40 miles (surface distance). There is talk of 100-mile ranges being within practical bounds.

The "Gunfighter" programme is still in its early stages, but the ordinary RAP shells will soon be in production and the R.A.N. is watching developments closely.

A decision to incorporate such weapons in the Australian armoury could have far-reaching procurement implications. This is primarily because, unlike sophisticated missiles such as the Tartar, the RAP shells would be well within Australia's industrial capabilities.

FERRO-CEMENT LIGHTERS

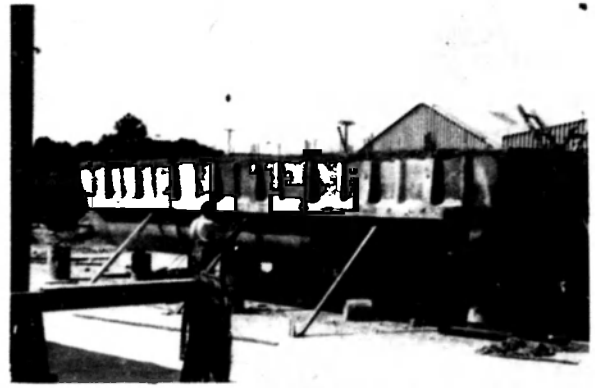
During 1967, the Department of the Navy took delivery of three lighters constructed in ferro-cement. These lighters, the first ordered by the Department in this material, are being used for general lighterage work on the Harbour. They are small prototypes which will be used to assess the value of the material in terms of first cost and maintenance in comparison to the more conventional materials, steel and timber.

Construction was carried out in the Caringbah factory of Fabbrostone Pty Limited.

Ferro-cement is the name given to a thin reinforced concrete construction pioneered by Professor Luigi Nervi, the world famous Italian Engineer. Using special techniques, many layers of fine steel reinforcing fabric are incorporated into thin concrete panels between ¼" and 1" thick to give an extremely strong but light construction. It has the advantage of being more flexible than normal concrete, and does not crack under load.

The external skin of these lighters is only 1" thick, but this provides a hard wearing and corrosion-resistant surface which is completely watertight. The strength of the material can be judged by the fact that these panels are designed to carry loads of 320 lbs/sq/ft, approximately five times as heavy as those carried by the floors of a modern city office building.

A ferro-cement lighter being lifted by the floating crane "Falcon" at Pyrmont Wharf. Note the heavy rubber fenders.



Assembly of one of the six-hull units at the Caringbah factory of Fabbrostone. The 2-inch joint between elements, which is later filled with lightweight concrete and the strengthening ribs for the fenders can be clearly seen.

The first lighter was tested by loading the deck with steel slabs up to this design capacity, and the loads were carried without deflection or cracking of the panels. The fully laden lighter was then towed around the Harbour.

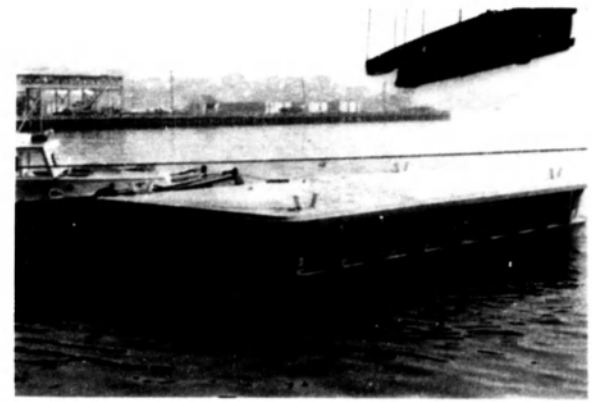
As a further test to check the capacity to carry point loads, one and two ton weights were placed on the 1" thick deck panels supported on a 2" square bearing area. Again there was no deflection or cracking.

These lighters are 36-ft long, with a beam of 18-ft and weigh 40 tons. The design load is 30 tons with two feet freeboard, but heavier loads can be carried if required.

Much larger lighters or boats can be constructed of ferro-cement. Designs have already been prepared for the construction of lighters with capacities in excess of 1000 tons for use in conjunction with container shipping, and fishing trawlers of up to 60-ft are operating in Australasia.

Ferro-cement vessels can be constructed to comply with the certificate requirements of the Maritime Services Board of New South Wales, or for classification by Lloyds Shipping Register.

The material offers the advantages of long life with low maintenance costs, and it is expected that its use for marine work will rapidly expand.



An R.A.N. workboat taking delivery of a lighter at Pyrmont. These flat-top lighters are all-purpose barges for harbour or coastal wok.

Construction Details

The Lighters are constructed of six separate watertight hull units, and six deck units. These are assembled together with a thin joint between the elements, and the joints then filled with a lightweight concrete. The units are then prestressed together in the longitudinal direction.

The form of construction ensured that the joints made below the waterline did not affect the watertightness of the vessel.

The Department's Specification called for heavy rubber fendering at the waterline and deck level, with vertical fenders along the sides and ends. The rubber has a section of 6" x 5", with a 2" centre hole, and is fixed inside galvanised steel housings onto thickenings in the ferro-cement shell.

Consultants for the design and construction were Naval Architect Leonard Hedges, A.R.I.N.A. and E.J. Perry, M.E. A.M.I.E. Aust., Civil Engineer.

Become a Blood Donor

Can you help your Editor?

I have received many requests from readers, asking me to include more articles in "The Navy" concerning —

1. The foundation, history and early personalities of the Royal Australian Navy, and
2. Warship advancement 1900 - to date (all navies)

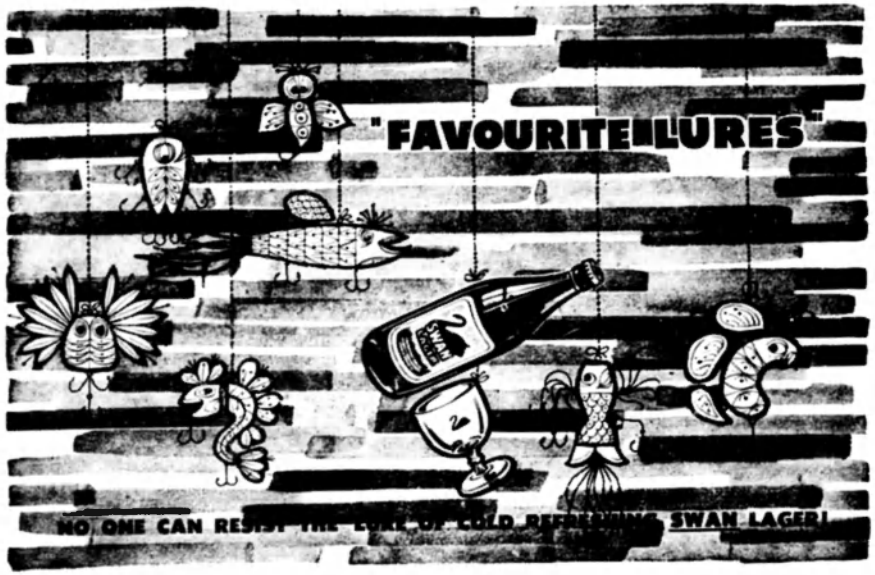
Naturally, I will be delighted to research these subjects, however, my handicap is lack of reference material. I would therefore be appreciative if any readers possessing any works of reference (books, photographs, magazines, etc.) and who would be willing to donate same, kindly forward this material to:

The Editor,
"The Navy" Magazine,
Box C178, Clarence Street Post Office,
SYDNEY, N.S.W. 2000. AUSTRALIA

Persons interested in writing for the magazine (in an honorary capacity) on the above subjects are invited to forward manuscripts for consideration.

All material received will be acknowledged in future editions of "The Navy".

—EDITOR



SEA CADET CORPS NEWS

NEW SOUTH WALES DIVISION

Report of Activities and Training Undertaken by the New South Wales Division for the Quarter Ending 31st December, 1967.

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

Harbour and weekend training was conducted in the following ships and establishments:—

H.M.A.S. QUEENBOROUGH, 13-15 October.
H.M.A.S. ANZAC, 13-15 October.
H.M.A.S. VENDETTA, 13-15 October.
H.M.A.S. CRESWELL, 13-15 October.
H.M.A.S. QUEENBOROUGH, 20-22 October.
H.M.A.S. ANZAC, 20-22 October.
H.M.A.S. VENDETTA, 20-22 October.
H.M.A.S. SUPPLY, 27-29 October.
H.M.A.S. WATSON, 17-19 November.
H.M.A.S. PENGUIN, 8-10 December.
H.M.A.S. WATSON, 8-10 December.

The annual Sailing Regatta was held on Sunday, 19th November, 1967 and the starting and finishing lines were laid off Snapper Island. T.S. SYDNEY acted as the host Unit for the day and scores of parents, friends and Cadets used the Island both for midday barbecues and for advantage points to watch the various races. The following Units won trophies and these were presented by Sea Cadet Commander L. E. Forsythe, the Commanding Officer of T.S. SYDNEY.

T.S. WARREGO. Open pulling race (whalers) "Warrego" Cup.

T.S. WARREGO. Under 16 years pulling race (whalers). (No trophy.)

T.S. SYDNEY. Junior Navy League Cadets pulling race (whalers). Navy League Whaler Pulling Cup.

T.S. SYDNEY. Whaler Sailing Race. Whaler Sailing Cup.

T.S. WARREGO. Overall Point Score Winner. Aggregate Point Score Trophy.

Over the years the names of T.S. WARREGO and T.S. SYDNEY appear regularly on all the sailing regatta trophies and other Units have been urged to make a determined effort in 1968 to change this pattern.

During the period under review it was announced by the Director of Naval Reserves that T.S. TOBRUK (Newcastle) had been awarded the distinction of being the "Most Efficient" Unit in Australia.

There is a perpetual trophy which is presented each year to the successful Unit by the Federal Council of the Navy League of Australia and it is understood that the Federal President of the League is making appropriate arrangements for the presentation.

Saturday, 30th September was "Open Day" at Units and it was held as usual the weekend prior to the commencement of Navy Week. The overall interest shown by the general public was reasonable and numbers were on a par with the attendance figures for last year.

A Guard of Honour consisting of 24 Sea Cadets was provided for the Official Guests at the Navy League Ball held at the Hotel Australia on Friday, 17 November, 1967. The salute was taken by the Federal President of The Navy League of Australia — Rear Admiral H. A. Showers C.B.E.

Liaison has commenced with the R.A.N.R. Cadet Units with the object of co-ordinating their training requirements commencing 1 January, 1968. It is felt that the administration by this Division of all their activities associated with training will undoubtedly prove beneficial to the School Cadets.

CONTRIBUTIONS INVITED

The Editor invites persons to submit articles and photographs 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., 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

"All nice girls like a sailor!", even 4-year old Jane Nutting of St. Ives, New South Wales, who visited H.M.A.S. Oxley with her father, Sub.-Lt. Nutting, R.A.N.R.

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 not required to undergo any medical examination and are fully insured against accident while on duty.

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: "El Abrigo", 4 Rangers Ave., Cremorne, 2090.

QUEENSLAND: C/- Box 376E, G.P.O., Brisbane, 4001.

SOUTH AUSTRALIA: C/- 30 Pirie Street, Adelaide, 5000.

TASMANIA: C/- 11 Quorn Street, Sandy Bay, 7005.

VICTORIA: C/- Room 8, 8th Floor, 528 Collins St., Melbourne, 3000.

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

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

NORTHERN TERRITORY: Box 444, P.O., Darwin, 5794.

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

H.M.A.S. Attack-First "A" Class Patrol Boat

First of her class, the 100' Fast Patrol Boat H.M.A.S. ATTACK built by Evans Deakin & Co. Pty. Ltd. in their modern Kangaroo Point, Brisbane, Shipyard, completed 8 days of sea trials in Moreton Bay on November 13, 1967.

Acceptance trials and hand-over took place on 16 November and H.M.A.S. ATTACK was commissioned at H.M.A.S. MORETON on 18 November.

Evans Deakin are building 10 of these fast long-range units for the Navy, and to the end of last year five have been launched from Kangaroo Point — "Attack", "Samarai", "Acute", "Aware" and "Assail".

The rate of launching of the remaining 5 units to be built at Kangaroo Point is expected to quicken now that reconstruction of the shipyard is complete and anticipated improvements in the flow of manufactured components and block assemblies are realised.

ATTACK was launched on 8 April in what was at that time a rather unique manner. When Mrs. Lilyan Chan, Mayoress of Darwin in the Northern Territory, smashed the traditional bottle of champagne against the bow of the boat and named her ATTACK, the 100 ton dockside travelling crane lifted the boat, supported in a cradle, from the shipyard and deposited her gently on the Brisbane River.

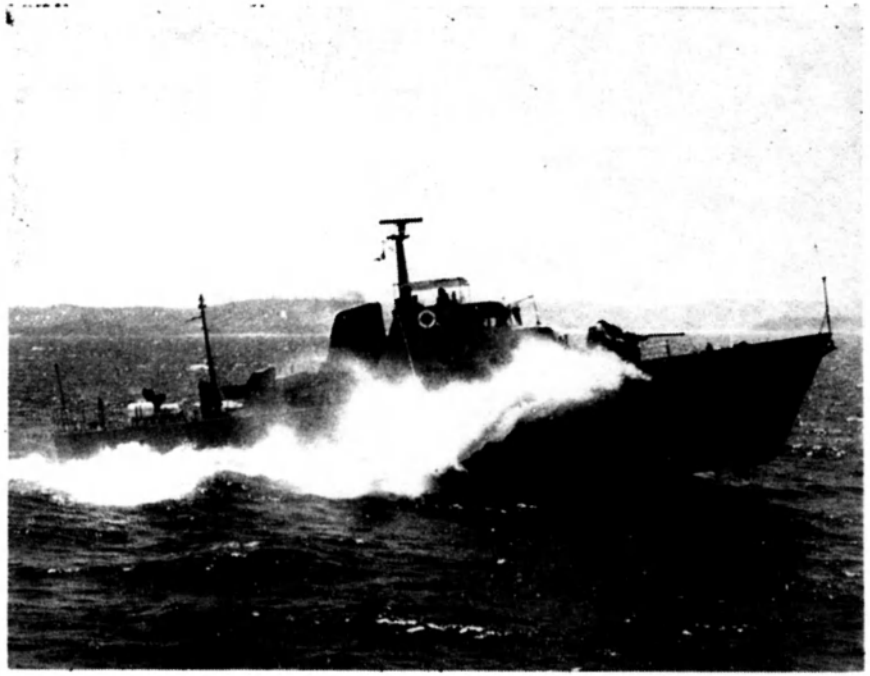
Designed by the Royal Australian Navy, ATTACK is 107 ft. 6 inches overall length with a beam of 20 feet, draft 7 feet 6 inches and displacement is 140 tons.

Powered by two Paxman Ventura high speed diesels, driving twin screws, ATTACK has a steel hull and aluminium superstructure.

Airconditioned living quarters are provided for the complement of 3 officers and 16 men.

Armament includes one 40/60 M.M. Bofors Gun, two 0.5 Browning Machine Guns and a 2" Rocket Flare Launcher.

Other equipment includes radar and long range communication.



One of the R.A.N.'s new patrol boats, H.M.A.S. ATTACK left Sydney on Wednesday, 20 December, 1967, for the Darwin Station. ATTACK is under the command of Lt. Commander R. J. R. Pennock, R.A.N.

Periscope on Australia

by Grommet

H.M.A.S. OVENS

The Royal Australian Navy's third Oberon class submarine was launched and named H.M.A.S. OVENS by Lady Slim on 4 December, 1967.

* * *

OLD ENSIGN FOR WAR MEMORIAL

During December last, Commander I. M. Kelly, commanding officer of H.M.A.S. ANZAC, presented the ship's former old style White Ensign to the Australian War Memorial in Canberra. The photograph below shows Commander Kelly handing over the ensign to Mr. W. R. Lancaster, Director of the Australian War Memorial.

Old Ensign for War Memorial.

COLLINS TROPHY

The "Collins Trophy" for 1967 has been awarded to 725 Squadron.

In announcing the award, F.O.I.C.E.A., Rear Admiral T. K. Morrison, C.B., C.B.E., D.S.C., said the all-round performance of the squadron during the year, in running of OFS courses and the flying of sorties for FRU and SAR, was highly efficient.

To this, he said, must be added their performance in providing and operating four helicopters for H.M.A.S. SYDNEY, which was carried out in an outstanding manner.

FOICEA also commended 816B Squadron for their high performance during their last embarked period.

* * *

ADMIRAL TO RETIRE

An admiral who navigated the cruiser H.M.S. HAWKINS 1,000 miles south of Cape Horn, was rescued from the sinking H.M.A.S. CANBERRA and survived Kamikaze attacks on H.M.A.S. AUSTRALIA, retired from the R.A.N. on Thursday, 7 December, 1967.

He is Rear Admiral Jack Stratton Mesley, 56, who was Second Naval Member and Chief of Naval Personnel.

Admiral Mesley is a navigation specialist. During World War II he served with the Royal Navy and in the Australian ships HOBART, CANBERRA, AUSTRALIA and SHROPSHIRE. He also commanded the destroyer of the "Scrap Iron Flotilla", H.M.A.S. VENDETTA.

After the War Admiral Mesley commanded H.M.A. Ships TOBRUK, ANZAC, SYDNEY and MELBOURNE.

He was succeeded as Second Naval Member by Captain W. J. Dovers who was promoted Rear Admiral on appointment.

* * *

THIRD GUIDED MISSILE DESTROYER

Australia's third DDG, H.M.A.S. BRISBANE, commissioned in Boston on 16 December, 1967.

After commissioning, BRISBANE commenced her work-up off the American coast and will sail for Australia later this year.

* * *

THREE-STAR ADMIRAL SEES FOR HIMSELF

Vice-Admiral Sir Alan McNicoll — Chief of the Naval Staff — wearing a three-star steel helmet and a flak jacket looks out from the bridge of the Australian guided missile destroyer H.M.A.S. PERTH during his recent visit to the ship (see photo).

It was the first time the flag of a Chief of Naval Staff has been flown in a ship of war.

H.M.A.S. PERTH is serving with the U.S. Seventh Fleet and was one of the R.A.N. units in Vietnam visited by Sir Alan McNicoll.

Three Star Admiral sees for himself.

ORDER FOR TAPE RECORDERS

The Royal Australian Navy has ordered 50 magnetic tape recorders for operational use from the Rola division of Plessey Pacific Pty Ltd.

The value of the order is in excess of $100,000. The recorders were designed in Australia specifically to meet R.A.N. specifications.

* * *

NEW OCEANOGRAPHIC INSTRUMENTS TESTED

The R.A.N.'s research vessel H.M.A.S. KIMBLA, earlier this year tested an advanced oceanographic instrument which is the first of its type in Australia.

The instrument, a velocimeter, is used for measuring the velocity of sound in sea water and was lowered by a winch specially designed by Navy scientists and engineers to stand the strain of recovery from great depths.

H.M.A.S. STALWART ACCEPTED AND COMMISSIONED

The R.A.N.'s newest ship was accepted from her builders on 8 February, 1968. H.M.A.S. STALWART, a destroyer tender whose job will be to maintain the Navy's small fighting ships between refits and away from the facilities of major shore dockyards. The Minister for the Navy, the Honourable Don Chipp, M.P., signed the acceptance papers which were also signed by the chairman of Vickers (Australia) Pty. Ltd., Mr. E. P. M. Harty (see photo).

* * *

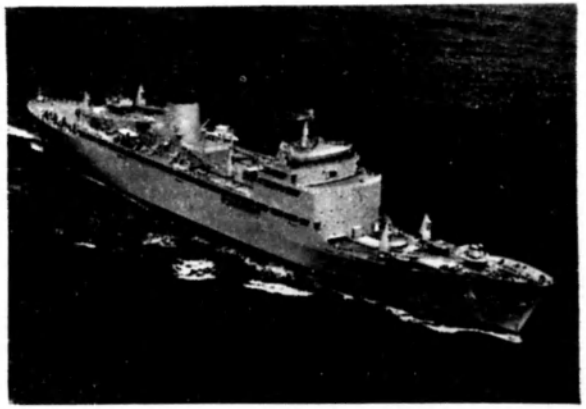
NEW TIDE TABLES

For the first time, tables of tide predictions have been produced for Australian ports by the R.A.N. Hydrographic office.

One thousand copies of the 175 page publication, "The Australian National Tide Tables" are now available from accredited chart agents at a cost of $3.00.

The publication expands information in the "Admiralty Tide Tables" by raising from 22 to 50, the number of standard ports in Australia and New Guinea, and by listing auxiliary data not previously given.

The Tables have collated the predictions of port authorities, and use for the first time, predictions and analysis of tidal data by an Australian authority — the Horace Lamb Centre for Oceanography at the Flinders University of South Australia. The Centre did 17% of the predictions, while the remainder



H.M.A.S. STALWART, destroyer tender.

were done by the well established Liverpool Tidal Institute.

* * *

NEW CHIEF OF NAVAL STAFF

Vice Admiral Sir Alan McNicoll will retire as Chief of Naval Staff and First Naval Member on reaching the retiring age of 60 on 3 April, 1968.

Vice Admiral McNicoll will be succeeded by Rear Admiral V. A. T. Smith, at present Deputy Chief of Naval Staff.

Rear Admiral Smith has also held the appointments of Flag Officer Commanding the Australian Fleet, Second Naval Member and Fourth Naval Member and is a graduate of the Imperial Defence College.

He will be promoted to Vice Admiral on taking up his new appointment on 3 April, 1968.

Rear Admiral Smith was born on May 9, 1913 at Sydney, N.S.W., and entered the Royal Australian Naval College in 1927.

He was promoted Mid-shipman in 1931, Sub Lieutenant in 1934 and Lieutenant in 1936.

He specialised in Naval Aviation and joined the Fleet Air Arm in 1937.

During World War II, he was Mentioned in Despatches for air torpedo attacks on the SCHARNHORST.

He was awarded the Distinguished Service Cross during fighter operations from H.M.S. ARK ROYAL.

He returned to Australia in 1942 and in August of that year was serving in H.M.A.S. CANBERRA when that ship was lost in action.

Rear Admiral Smith (with the rank of Commander) was executive Officer in H.M.A.S. SYDNEY during the Korean operations in 1951.

He was promoted Captain in 1953, and Rear Admiral in 1963.

He was awarded the C.B.E. in the New Year Honours List, January, 1964.

Rear Admiral V. A. Smith

* * *

NEW IKARA TRAINER

A new $1.3 million Ikara training installation has been completed at the Weapons Research Establishment at Salisbury, South Australia.

The facility was installed and is operated by E.M.I. (Australia) Pty. Ltd., under the supervision of the Department of Supply, acting for the R.A.N.

Operation of the trainer by E.M.I. is the first time that training has been conducted by a civilian organisation for the Navy, on such a scale and on a continuing basis.

The trainer simulates the firing control system for the Ikara missile and apart from the missile magazine and launcher, is similar to the installations in Australian guided missile and escort destroyers.

Courses ranging in duration from one to three months, incorporating technical and operational aspects of the system, will be conducted by the training staff which includes several employees of E.M.I. who have been responsible for fitting Ikara to ships of the R.A.N.

* * *

CADET MIDSHIPMEN FROM PAPUA-NEW GUINEA

Four Cadet Midshipmen from the Territory of Papua and New Guinea have been selected for training at H.M.A.S. CERBERUS, Westernport, Victoria. The cadets are scheduled to join CERBERUS on 3 March.

The cadets have already undergone a 12 months training course at H.M.A.S. Tarangau, Manus Island.

Upon completion of the course at CERBERUS, the cadets will spend a year undergoing further training in ships of the Australian Fleet and eventually they will return to Papua-New Guinea to help man the Navy's new patrol boats.

* * *

COMMODORE H. D. STEVENSON

Commodore H. D. Stevenson, currently Naval Officer-in-Charge, Western Australia, is to be promoted Rear Admiral and appointed Deputy Chief of Naval Staff from 2 April.

Son of the late Bishop of Grafton and Mrs. W. H. W. Stevenson, Commodore H. D. Stevenson was born in Brisbane on the 24 August, 1918.

He entered the Royal Australian Naval College in 1932, and graduated in 1935.

Commodore Stevenson has a distinguished war record.

He served with the Royal Navy in the Mediterranean during the Spanish Civil War, and from the outbreak of hostilities in 1939 until 1944 he saw service in the Indian Ocean, the Red Sea and the Mediterranean.

In 1944 he did the Long Navigation Course (N) in the United Kingdom and on completion of this, returned to resume service in the R.A.N. in the Pacific area where he was Mentioned in Despatches.

After the war he was engaged in mine clearance operations in the South West Pacific, followed by a period in England on the staff of H.M. Navigation School.

In 1951 he became Fleet Navigating Officer in H.M.A.S. AUSTRALIA and later in H.M.A.S. SYDNEY.

He was Director of Plans at Navy Office, Melbourne, until 1955, and then Executive Officer of H.M.A.S. VENGEANCE until she paid off in England in 1956.

After undergoing the R.N. Staff Course, he served a further period of exchange duty at the Admiralty.

On return to Australia, Commander Stevenson was appointed to command of H.M.A.S. TOBRUK

and as Captain (D) 10th Destroyer Squadron.

From December 1959, until November 1961, he served on exchange duty with the Royal New Zealand Navy.

During this period he commanded the cruiser ROYALIST. He is the only Australian Naval Officer ever to have been in command of a New Zealand cruiser.

In November 1961, he became Director of Plans at Navy Office, Canberra, where he remained for two years.

He was then appointed Captain of the Fast Troop Carrier, H.M.A.S. SYDNEY.

He became Captain of H.M.A.S. MELBOURNE on April 5, 1964 and from the flagship, he went to the U.K. for the Imperial Defence College course.

On June 30, 1967, he succeeded Commodore Marks as N.O.I.C.W.A. at H.M.A.S. LEEUWIN.

* * *

SERVICES TO MARK "VOYAGER" SINKING

The fourth anniversary of the sinking of H.M.A.S. VOYAGER was marked by Naval church services on Sunday, 11 February and a wreath was dropped by helicopter into the sea off Jervis Bay, on Saturday, 10 February, 1968.

VOYAGER sank with the loss of 82 lives on 10 February, 1964, after a collision with the aircraft carrier H.M.A.S. MELBOURNE.

Chaplain B. Rolfe, R.A.N. (in a Wessex helicopter) prepares to throw a wreath over the sea where the destroyer H.M.A.S. VOYAGER sank on 10 February, 1964.

+ SUPPORT THE RED CROSS +

NAVAL BOFFINS DO IT AGAIN

For several years past the U.S.S.R. has produced every year a prototype ship which has eventually run into series production and considerably added to the projection of the military power of the Soviet Union overseas. This year is no exception. The Soviet Navy has done it again, and the first unit of a new class of guided-missile-armed destroyers, known as the 'Kresta' class, has been commissioned for service.

The new ship has an estimated displacement of about 6,000 tons with a length of 508.5 ft., a beam of 55.8 ft. and a draught of 20 ft. Her armament includes two twin launchers for surface-to-surface guided missiles, two twin launchers for surface-to-air guided missiles, two 12-barrelled anti-submarine rocket launchers, two six-barrelled depth-charge mortars, four torpedo-tubes in two twin mountings, four 57 mm. anti-aircraft guns in two twin mountings, and a helicopter. Her main propelling machinery of 100,000 shaft horse power gives her a speed of 35 knots. She has a complement of 400 officers and ratings.

In construction the new ship appears to be a hybrid or dual-purpose anti-submarine warfare and guided - missile - armed destroyer leader or cruiser frigate. The design is a combination of that of the immediately preceding and successive 'Kashin', and 'Kynda' classes of super-destroyers and a logical follow-on from the recently built 'Kashin' class, but of slightly enlarged type and provided with a helicopter hangar and flight apron.

Five ships of the new class were reported to be under construction at the Zhdanov Shipyard, Leningrad. The prototype ship was laid down in September 1964, launched in 1965 and completed sufficiently for sea trials, which were carried out in the Baltic, in February 1967. The second and third ships of the class were launched in 1966. 'Kresta' is the NATO designation for the class, and this incidentally is a source of considerable puzzlement to Soviet naval officers, as are the other NATO designations given to successive new classes of Soviet destroyers built over the past few years: 'Kashin', 'Kynda', 'Krupny', 'Kildin', 'Kotlin SAM', and 'Kotlin', but every class has to have a niche or a name in the official handbooks of the West, and although the Soviet Navy obviously has its own designations for the various classes, these names or codes are not publicised and names of individual ships are not announced and in most cases are suppressed entirely in favour of numbers which are changed from time to time, apparently being based on their fleet assignment, geographical location, or specialised role. Some ships have had several numbers in a short lifetime, and more numbers have been reported than there are actually ships in the class. Once in a while, still further to cloud the issue, a name comes up for a ship which previously bore only a number.

To add to the confusion there is a tendency, perhaps for prestige or propaganda purposes, to refer to the latest guided-missile-armed destroyers or frigates as "rocket cruisers", and the term, it has to be admitted, is not entirely inapplicable, although they are too much on the light side to fall into the true cruiser category usually reserved for ships of very long endurance which can operate quite independently of support. And there may be another reason. The Soviet policy apparently is to progressively reduce the number of the much bigger true cruisers in operational service in favour of smaller types of cruising or scouting ships. The older heavy cruisers are already discounted except for training and accommodation, and even the number of the now well known comparatively modern Sverdlov-class cruisers is to be reduced. So the mantle of the cruiser, both name and role, is being handed down.

Another consideration is the progressive expansion, both in size and numbers, of the Soviet cruising fleet of nuclear-powered submarines. The original nuclear-powered submarines built by the U.S.S.R., of the anti-submarine type, known as the 'N' class, ran into 12 units, and these were followed by 13 nuclear - powered submarines of about the same size, 4,100 tons submerged, equipped with three launching tubes for ballistic missiles. Then came the 15 nuclear-powered submarines of the 'E 1' class in the construction of which six tubes for launching six cruise missiles were incorporated. And now there are 10 nuclear-powered submarines of the 'E 2' class displacing 5,600 tons submerged, evidently a development of the 'E 1' sub-group lengthened to accommodate two more missile launchers. So one way and another, the U.S.S.R. has boosted her cruising fleet while apparently discarding her cruisers.

First unit of a new class of guided-missile-armed destroyers known as the "Kresta" class.

WHAT'S NEW?

Compiled by "Periscope"

HEADS UP

A new life jacket guaranteed to keep even an unconscious child in a correct survival posture in the water has been announced by the Nicki Clothing Co. Ltd., of Douglas, Isle of Man. Called the Spinova Lifejacket, it is the first children's life preserver approved by the British Marine Safety Division. It is made of a new "closed cell" foam which retains its buoyancy indefinitely whether cut, punctured or crushed, and is quickly fitted across shoulders and around the neck. In tests it was proved capable of forcing an exhausted or unconscious person into the correct survival position within seconds of entering the water in a headfirst plunge. Price — about $12.25 each.

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NYLON CHAIN MAY REPLACE METAL

One of the most recent developments in nylon is the Tuff-Link solid nylon moulded interlinked chain.

Tuff-Link provides an alternative to metal chain which cannot be completely protected from rust and corrosion — even when galvanised or heavily greased. Unlike metal chain links, which are welded during manufacture, thus leaving a possible weak section, the Tuff-Link chain link is moulded in one and therefore without a weld.

Tuff-Link is moulded already interlinked. The link design, with thicker ends and a central support for added strength, makes the most of its method of manufacture by the injection moulding process. It is light in weight (as little as 3-oz. per yd. for 1.5-in. link chain), clean to handle, non-magnetic, non-conductive, resistant to atmospheric extremes of temperature, rustless and practically noiseless. It has a high strength-to-weight ratio and is made in three colours and three sizes — easily lockable shackles in sizes corresponding to the chains are also available.

For marine work, Tuff-Link is ideal as it is light in weight, resistant to fresh or salt water and needs no such maintenance as painting or greasing. It is suitable for small craft anchor chain, marker buoys and, as it cannot twist or knot, is increasingly used for fishermen's net supports.

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THREE 'EST CLAIMS

The strongest, lightest and most fatigue resistant (toughest) aerospace fastening systems are all produced by Standard Press Steel Co., Pennsylvania according to the company. Its strongest, an external wrenching alloy-steel bolt has a tensile strength of 300,000 lb./sq. in. and a shear strength of 180,000 lb./sq. in. Lightest bolt is made from beryllium giving the highest strength to weight ratio of all materials. The high fatigue fasteners have a 20 per cent greater fatigue strength than previous nut and bolt combinations.

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MARCONI RADAR SERIES S600

Marconi has evolved a new series of radar equipment, Series S600, which uses a modular system of construction, incorporating aerials, transmitters and associated equipment designed to make maximum use of solid state devices, both conventional and microelectronic. From these, claims Marconi Radar Division manager John Sutherland, any practical combination of radar systems can be constructed, with custom-built performance, but cheaper, more reliable and in more compact form than was previously possible. It incorporates 12 different types of aerial heads, five different transmitters-receivers, and a complete selection of signal processing equipment built in modular form. Marconi Myriad Computers can be integrated, together with data displays, to provide advanced data handling facilities to any system. SECAR secondary radar system can also be added, with aerial fitting on to any of the surveillance radar heads. Different combinations can be used to form radar systems, covering ground control of interceptors, tactical control for weapon systems, early warning and reporting, general air surveillance, military or civil ATC, coast watching etc., with civil ATC systems ranging from the most simple to the most sophisticated.

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CHECK LIST

A simple and easily installed device from Britain gives immediate and visual indication of changes in the trim of a ship during cargo loading. The Chalmitrim Cargo Trimming Indicator System, developed by Andrew Chalmers & Mitchell Ltd., of Glasgow, Scotland, is based on a sensitive pendulum arrangement. As the ship lists, the pendulum moves, causing magnets attached to it to operate dry-reed switches. These in turn flash on sets of indicator lights strategically located on the vessel. The system can he set up to give audible warnings as well. Red lamps show lists to port, green lamps lists to starboard. The greater the list, the more lamps light up. The system is intended to reduce cargo loading and unloading time. Price: about $500.

• • •

SMALL STARTER

A small jet engine starter which runs on the same fuel as the engine it will start has been developed by The Garrett Corporation. Known

as Model JFS100, this starter is of the free turbine type, comprising a gas generator section, a power section and an accessory section. Each of the three sections can be removed and replaced as a complete unit.

Operating at shaft speeds of up to 8,000 r.p.m., the JFS100 has demonstrated starts on such engines as the J79, TF30 and Allison 501K14 in 20-30 seconds. Developed under USAF sponsorship, the starter mounts directly on to the main engine starter pod. The weight is 75 lb., length 20 in. and maximum width 11.5 in.

* * *

HOVER LOW

The versatile hovercraft (photo), capable of skimming just above the surface of open fields, lakes, beaches, etc., has been brought within the popular-price range by Hover-Air Ltd., of Crowland, England. Both cost and weight have been substantially reduced for the company's Hoverbat construction kit, by employing reinforced plastics rather than conventional aluminium and wood in propellers, lift fans and ducting. Use of new materials, supplied by Deeglas Fibres Ltd., and by Artrite Resins Ltd., both of Camberley, England, is said by the manufacturer to have cut costs of the lift and propulsion units by one-half. The 30-inch propeller and the lift fan have been reduced in weight to 4½ pounds each; and the ducting to 21 pounds. The Hoverbat, which has been given extensive tests by Britain's Royal Corps of Transport, is expected to find wide acceptance among sportsmen and applications in various commercial operations. The kit (complete except for power plant) sells for $183.

* * *

DEVELOPMENT OF FLUIDICS

Considered to be one of the leaders in the design and construction of fluidic control elements, Aviation Electric Ltd., Montreal has recently developed integrated fluidic circuits and an interface valve. It is the only Canadian company working on the development of this technique. Fluidics is a relatively new control method which makes use of fluid movement guided through special channels to perform logical functions without moving parts. It is based on the Coanda effect — named after the discoverer — by which a fluid flow adheres or attaches to a curved surface. It can be used to produce switching or amplification functions normally provided by electrical or mechanical devices. Attractions of fluidics are low cost, reliability and, compared with mechanical systems, low weight.

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AUTOMATIC MOORING WINCH

Laurence, Scott & Electromotors Ltd. announce the revised edition of the Publication 33TR which describes the latest version of the Scott 'Tight Rope' automatic mooring winch. Characteristics include automatic tension control, and an alarm and monitoring system to allow unattended operation.

* * *

OVER THE WAVES

A very low frequency system of broadcasting stations and a newly developed compatible receiver, capable of picking up signals at a distance of 6,000 miles, are claimed to have "taken the guesswork" out of surface navigation of ocean-going vessels. The Omega Navigation System was developed by the Ryan Aeronautical Co. of San Diego, Calif., on space-age principles.

The 30 lb receiver (photo) can be readily installed on any ocean-going vessel. It occupies less than 1 cubic foot of space. Receivers currently are able to pick up signals transmitted from Omega broadcasting stations in Norway, Trinidad, the continental U.S. and Hawaii, covering the North Atlantic and South Pacific regions. With the completion of four additional stations, Ryan says, worldwide navigational coverage will be available for the first time in history.

THIN FUEL TANKS

Paper-thin rubber fuel tanks that allow full use of internal space in aircraft are being produced in Canada by UniRoyal (1966) Ltd. Specification issued by the company requires that these bladder type tanks should weigh 0.102 lb./sq. ft. with a wall thickness of 0.018 in. Company says that there is a growing requirement for the bladder type tank on commercial aircraft.

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COME FLY WITH ME

The parachutist is now offered an opportunity to convert his abrupt drop to controlled flight with a Parawing, invented and marketed by Irvin ParaSpace Centre of Glendale, Calif. The Parawing packs and deploys like a conventional parachute. But once opened, it can be controlled by the jumper in turns, banks and modified flight. Due to its design, the canopy is exceptionally stable and is capable of carrying the jumper 2½ feet in any chosen direction for each foot of altitude. Landing speed is only about half that of conventional parachutes (10 feet per second as compared with 18 to 20 feet per second), minimising the risks of injury. Price: $349.95.

— BOOK REVIEW —

THE SEA IN MODERN STRATEGY

(Studies in International Security: 11)

Author: L. W. MARTIN

Publisher: Chatto & Windus, London, 1967, for the Institute for Strategic Studies
190 Pages — Price $5.15

Reviewer: B. R. Nield, Lieutenant Commander, R.A.N.R. (Retired)

The so-called Cold War has passed through several phases in the last twenty years. At first it seemed like a form of words, or like a disguise for the relapse into peace that occurred after the Second World War. At other times it seemed like an inside story that could be used to explain everything — very useful for diplomats and journalists. Finally, however, we must admit that the Cold War has had a very great effect on the fighting forces of all the powers and, in particular, that it has changed military thinking enormously. Firstly, the difference between war and peace has been blurred: it is hard for anyone to know whether he is at war, or who the enemy is. Secondly, manoeuvres and planning are regarded less as preparations for survival against a determined enemy and more as a highly technical industry which, like chess or space exploration, can be pursued for its own sake.

Professor Martin's book is not easy to read or to summarise, and many of his opinions and conclusions are open to question. It should, however, be noted that he has ransacked the military and naval literature of the Cold War to write it. If we do not accept his conclusions, we should thank him for drawing our attention to some of the strange doctrines that are current today.

In the preface he states: "The present study attempts to form a bridge between the narrowly naval literature and the work of those analysts who have done so much to illuminate the wider problems of modern strategy."

He does, in fact, discuss various important issues, such as expansion of territorial waters and political limitations imposed on operations at sea. The thinking of the Cold War, as described by him, will seem scandalous to anyone who favours clear thinking. There is in this book a fair amount of confusion, more through the doctrines discussed than through any fault of the author. At times, however, we can justifiably criticise his style. For example, he writes (pages 44 and 45): "The forces that Western nations provide for the purposes of limited war will constitute an instrument capable of identifying the ambitiousness of any attack on communications. Such a force will even provide national leaders with a measure of strength with which to meet such an attack on its own terms for some little time beyond the points of identification should the improvisations of crisis management make this seem desirable."

In Chapter 6, "Costs and the Naval Balance", there is a documented and careful discussion of a very important question: in armaments, should quantity be always sacrificed for quality? Since our author does not answer this question plainly, I provide the answer. It is, definitely "No". War is so wasteful that the equipment used must be mass-produced. Such equipment, in an age of technological progress, is always, as seen by a designer, obsolete. Hence, anyone fighting in a war must, to win it, use obsolete equipment. In Australia shortly before the Second World War, a Cabinet Minister, in spite of expert naval advice, refused to authorise the scrapping of the old Australian destroyers. When war broke out, those destroyers became the famous scrap-iron flotilla, and by their achievements, the obstinacy and amateur judgment of a politician were vindicated.

This book should be regarded, not as a book of answers, but as a carefully written guide to facts, and as a book which can provoke and stimulate further investigation.

Nautical Notes from all Compass Points

By SONAR

ARGENTINA

Stabilisers for Minesweepers

According to a recent announcement the four coastal minesweepers recently purchased by Argentina from the Ministry of Defence (Navy) are to be fitted with Vosper activated-fin stabiliser equipment while refitting at the Group's Portchester and Northam yards.

CANADA

Three Services Are Now One

The Canadian Army, Navy and Air Force came to an end as separate Services on January 1, 1968, merging to form the new Canadian Armed Forces.

All servicemen now fall under one rank structure, based on Army grades, and serve under one ensign.

The process of integrating the three Services has been going on quietly ever since 1964 when the then Defence Minister, Mr. Paul Hellyer, set up single structures to control some functions common to all three Services, such as supply, training and command.

This integration process was generally accepted by the Services, but Mr. Hellyer's later Unification Bill, passed by Parliament in April, 1967, met with stiff opposition.

The dark-green uniforms proposed for the C.A.F. are still on trial, and even after approval it is expected to take until 1971 to get all Servicemen into the kit.

The Navy, source of some of the stoutest opposition to the bill, gets some special treatment, designed to make the switch to Army ranks more palatable.

The Defence Department has ruled that officers and men enrolled before today will continue to use "traditional naval ranks."

Future Servicemen assigned to the "naval environment" will only get naval rank designations if they perform "what clearly can be described as 'Navy' jobs."

But, like it or not, the captain and the ordinary seaman will be listed in the records as "colonel and private."

A number of other designations in the private to corporal level are being retained where they are descriptive of the job done — such as gunner, sapper or aircraftmen.

CEYLON

Patrol Boats

The first of nine patrol boats ordered for the Royal Ceylon Navy is hoisted aboard a freighter for shipment from Vosper Thornycroft Ltd. at Singapore. The vessels are 45 feet long; powered by two 280 b.h.p. diesel engines, they make in excess of 25 knots.

PEOPLE'S REPUBLIC OF CHINA

Missile Subs

Communist China has equipped its two largest submarines with launchers for nuclear missiles.

The U.S. Navy has solid evidence that three vertical launching tubes, capable of hurling missiles 380 miles, have been placed aboard each of the submarines now nearing completion at Dairen, in southern Manchuria.

This is approximately the range of a nuclear-tipped missile the Chinese claimed to have tested successfully on October 27, 1966.

So far, there is no evidence that missiles have actually been brought aboard the Chinese submarines.

The two submarines equipped with missile launchers, although conventionally powered and no match for atom-driven submarines in speed and range, could make it possible for the Chinese to make a nuclear strike on the United States years before their intercontinental missiles are perfected.

FINLAND

An artist's impression of the new class of Finnish Corvette (Fast Gunboats) to be powered by a Marine Olympus Gas Generator and a Brown Boveri two-stage turbine, 22,000 h.p. Note the flush deck, raked bow, simple and clean superstructure. Displacing approximately 600 tons and measuring 228.7 ft. x 26.2 ft., each of the two new vessels will be armed with one, 4.7 inch automatic dual-purpose gun forward and two, 40 mm guns in single mounts aft.

IRAN

Hovercraft and Missiles

The Iranian Navy has ordered a number of SR N6 and BH7 Hovercraft from the British Hovercraft Corporation, but the actual numbers ordered have not been disclosed.

The SR N6 is a small craft of only 9 tons, but the BH7 has a nominal gross weight of 40 tons. It comes in two versions: a fast attack craft (FAC) for naval use and a logistic amphibious craft (LAC) for Army operations.

The naval version is fitted with an Ops. Room and naval communications and radar. The armament can either be a rapid-fire medium-calibre gun, with full fire-control and/or surface-to-surface or surface-to-air missiles.

The BH7 is 76.5 ft. long, 41.2 ft. beam and 33 ft. in height. It has a maximum speed of 64 knots and an endurance of 10 hours. It is powered by 3,400 s.h.p. Rolls Royce/BSE Marine Proteus gas turbine.

Iran has also ordered the short-range sea-to-air missile, Seacat, for five ships of her navy.

ISRAEL

Search Halted

On February 5, 1968, Israel officially declared the submarine "Dakar" and her 69 man crew lost, eleven days after they had disappeared in the Mediterranean.

JAPAN

Fifteen Years of Plans and Progress

The Japanese Navy, or the Japanese Maritime Self-Defence Force, as it is still known, is dedicated to defence plans, and likes to formulate these plans, like several other nations determined to regain their former maritime importance, in manageable and convenient periods of five years.

And very well it has done it, too. Most of the plans have been implemented, and with the Japanese shipyard workers' penchant for industry, without being hidebound by demarcations of trades and skills, the most complex and quite sizeable warships have been turned out in only a fraction of the time taken to build similar vessels in other countries.

The First Five Year Defence Plan lifted Japan out of the post-war depression and gave her the beginnings of a recognisable indigenous navy instead of the collection of discards

presented to the then new Maritime Self-Defence Force for policing local waters and for training purposes, and which were all former United States warships surplus to requirements, with the exception of a few vessels resurrected from the former Imperial Japanese Navy which had escaped the wholesale sharing out between the Allied Powers as reparations. Left with practically nothing after the Second World War, the Japanese Navy had to start from scratch, and it went about it in the usual precise and quite methodical Japanese way.

The Second Five Year Defence Plan, a programme carefully scheduled and progressed over the period 1962 to 1966, has indeed given Japan a viable and efficient fighting fleet. It included five submarines of 1,600 tons, four destroyers of 3,000 tons, seven destroyers of 2,000 tons, a minelayer of 2,000 tons, a training ship of 3,500 tons, two submarine chasers of 480 tons, six coastal minesweepers of 340 tons, and a dozen experimental vessels, auxiliaries and service craft. Most of these have been built and the others are being completed or are still in the pipeline.

Now the Third Five Year Defence Plan is under formulation. As we first heard of it the scheme was a very ambitious one. It called for the construction of no fewer than 70 new warships. The programme requested by the Maritime Self-Defence Force included two helicopter carriers of 4,800 tons, a guided missile destroyer of 4,000 tons, ten destroyer escorts of 1,500 tons, five more submarines of 1,800 tons, ten high-speed motor torpedo boats or fast patrol boats/interchangeable gunboats, ten minesweepers, ten patrol vessels, five training ships, five experimental vessels, and a dozen support ships.

Government Cut-down

However, the Navy proposes and the Government disposes, just as in this country, and by the time the politicians had nibbled at the new five-year programme it had been considerably cut down. It was later reported that, as approved by the Cabinet, the new plan now provided for 56 new warships including five submarines of 1,850 tons each, 14 destroyers of up to 4,500 tons displacement, a guided-missile escort ship, four training ships, a submarine rescue ship, ten minesweepers, ten patrol vessels, an experimental vessel, and ten auxiliary ships and service craft.

But even that amended list must have been thrown back into the melting pot, for according to an official screed received recently there is now to be a "Five Year Defence Build-up Plan", constituting the Third Naval Programme, scheduled from 1968 to 1972, which provides for Japanese shipyards to construct in quick succession 56 new warships aggregating 48,000 tons, this total to include two super-destroyers of 4,700 tons equipped with helicopters for anti-submarine warfare (DDH/ASW), five large submarines of 1,800 tons, a large destroyer of 3,900 tons armed with surface-to-air guided missiles (DD/SAM), three destroyers of 2,000 tons, eight destroyer escorts or frigates of 1,450 tons, and support ships, specialised craft and auxiliaries as required to modernise the fleet. All the same, this amended list is quite impressive, and judging by the speed with which some of the warships have been turned out in recent years, in five years' time the Japanese Navy is going to be really substantial.

The Japanese Maritime Self-Defence Force (why don't they drop this tag and call a navy a navy?) already comprises seven submarines all completed since 1960, twenty destroyers completed since 1956 (there are also four former United States destroyers), seven frigates completed since 1956 (there are also ten former American destroyer escorts and patrol frigates), 20 patrol vessels of the submarine chaser type all built since 1957, two minelayers, 24 coastal minesweepers all built since 1956 (there are also 13 ex-U.S. coastal minesweepers), ten motor torpedo boats, six minesweeping boats, four landing ships, and 160 support ships, auxiliaries, local vessels and service craft.

As an instance of Japanese hustle, once a programme and specific type has been decided, the guided-missile-armed destroyer AMATSUKAZE ("Heaven Wind"), 4,000 tons full load, the largest warship built by Japan since the end of the Second World War and the first guided-missile warship ever built by the Japanese, was built from keel laying to sea trials in 22 months, a creditable performance for a prototype of her size and complexity. Similarly one of the latest fleet destroyers, the diesel-powered YAMAGUMO, was built from laying down on the slip to operational service in little over two years.

The Japanese Navy now has a personnel strength of 42,000 officers and ratings.

In addition to the Maritime Self-Defence Force, or navy proper, Japan has a very useful war potential in the shape of her quite considerable fleet of vessels in the Coast Guard, administered by the Maritime Safety Agency as an external organisation of the Ministry of Transport, which comprises over 300 patrol vessels and coastal craft, manned by 11,300 officers and ratings.

Another potential is the Japanese Merchant Fleet which is now the fifth largest in the world with 6,105 ships aggregating 14,722,805 tons gross. This is an increase of 2,752,000 tons over last year. In round figures, of the 18 million tons of ships added to the world total in the past two years, some four million tons have gone to Japan. The Japanese have every reason to look back with pride over their shipbuilding, both naval and mercantile, over the last 15 years.

MALAYSIA

Navy to be Expanded — Ground and Air Support with Modern Ships

The Royal Malaysian Navy is to expand so that it would be capable of giving a "hard punch" to an enemy when the need arises.

The Navy will also be able to provide effective ground and air support with the inclusion of more sophisticated vessels fitted with modern equipment and weaponry.

The Navy's second frigate, "Hang Jebat", being built at Glasgow, Scotland, at a cost of $34 million, will be commissioned by the end of this year and, after exercises with the Royal Navy, will be operational in Malaysian waters by May, 1969.

The ship will be equipped with guided missiles, long and short range anti-aircraft guns and will have anti-submarine capabilities.

The HANG JEBAT will also be able to accommodate helicopters for rescue, supply and survey missions.

The Navy will also be acquiring two more patrol crafts and one fast patrol boat before the end of the year to supplement its present force of 17 patrol crafts and 3 fast patrol boats.

Five more patrol crafts are due next year.

With the addition of all these ships, the Royal Malaysian Navy will be in a position to give effective ground and air support to the forces whenever the need arises.

The coastal survey duties which were previously carried out by the Royal Navy will be taken over by the R.M.N.

Besides maintaining and expanding their present base at Woodlands, the Navy is also considering setting up a base in the East Coast, but said this will be subject to confirmation.

Steps have already been taken to increase the number of men in the Naval reserves.

Initially, the target is to build up the strength of the reserves to about one third of the regulars.

The Navy has about 3,000 men and officers with 40 ships, which includes a frigate, 17 patrol crafts, three fast patrol boats and several mine sweepers.

NETHERLANDS

New Construction

According to Lloyds' figures at the end of 1967, the Dutch shipbuilding industry rated 10th in the world in respect of tonnage still under construction — a total of 358,901 tons.

SOUTH AFRICA

Navy Equipped with New Safety Device

A new type of compressed air breathing apparatus, ideal for use in confined areas such as in ships, has recently been accepted by the South African Navy for fire-fighting and rescue work. Sixty sets of this apparatus have been supplied already. A Naval spokesman said that the entire fleet would eventually have between two and three sets on board each vessel.

A comprehensive training programme has already been started to familiarise naval personnel with this new type of emergency breathing apparatus.

At the Defence and Damage Control School, situated high on the hillside above the Simonstown dockyard, Lieut. P. D. Rogers, S.A.N., conducts fire-fighting training.

Naval personnel in protective clothing to guard against radiated heat, covered by oilskins, extinguish fires by means of high pressure water hoses. The men are equipped with the new breathing apparatus.

These devices are also used in the hazardous job of cleaning fuel tanks where it is difficult to gauge the amount of poison gas that may be present.

The set is supplied with two four-litre cylinders of compressed air and a mask with built-in second stage valve. The valve operating the cylinders only opens on demand, thus enabling a long period of use and adaptability to each person.

The unit is a versatile twin-cylinder two-stage compressed air breathing apparatus which has been designed for use in all toxic conditions and provides complete respiratory protection.

This apparatus is widely used by fire brigades, on board ships, in oil refineries, chemical works and the iron and steel industry.

SWEDEN

New Swedish Torpedo Boats

Details have now been released on a new type of Swedish torpedo boat, known as the T121 series.

These versatile craft have been built in Swedish yards for the Baltic and are designed to remain at sea for several days on end. They can accommodate a crew of 28.

They are capable of over 40 knots and have an endurance of 300 miles at speeds of 30 to 35 knots. Propulsion is three Bristol Siddeley Proteus gas-turbines with controllable-pitch propellers.

The boats are 139 ft. long with a beam of 23 ft. and a displacement of 190 tons. The first six boats were delivered in 1966 and more are planned.

The armament consists of six long-range, remote-controlled torpedoes and a Bofors 57 mm dual-purpose gun mounted on the foredeck. The gun is quick-firing and radar-guided. In addition, mines can be carried. Their electronic equipment is said to be highly sophisticated.

Sweden is another example of a country that has decided that it is more cost-effective to have a large number of fast small craft rather than a few sophisticated larger frigates. As Britain withdraws more and more into her shell, it would seem logical that she, too, should see the value of this outlook.

UNITED KINGDOM

Minelayer Commissions

The minelayer H.M.S. ABDIEL, commissioned on October 17 at the Woolston yard of her builders, John I. Thornycroft & Co. (see picture).

In addition to minelaying, she can act as a mine-counter-measures headquarters and support ship.

On the day after commissioning she sailed to join the 1st Mine Countermeasures Squadron, based in Scotland.

She displaces about 1,500 tons, measures 265 ft. long, 38 ft. 6 in. beam, 10 ft. draught and is propelled by two Paxman Ventura diesels.

Sea Dart Missile

The Royal Navy has placed the first production order with Hawker Siddeley Dynamics for the Sea Dart surface-to-surface missile, and first installations will be in the R.N's Type 82 destroyers, which are now being built. A new, lighter destroyer class and a new cruiser class are also to be Sea Dart carriers. The missile is powered by a BSE Odin ramjet.

UNITED STATES OF AMERICA

27 Destroyer Escorts to be Built

Avondale Shipyards Inc., New Orleans, has contracts to build 27 destroyer escorts of the "DE-1078" class for the United States Navy and has embarked on a $10 million yard expansion programme, financed entirely from its own funds, to compete with the backlog of orders which also includes HAMILTON class high-endurance cutters for the United States Coast Guard.

At Avondale the 12 sections of a DE's hull are prefabricated upside down, to facilitate down-hand welding which is considered the key to good shipbuilding, and are assembled on a building platten, the first stage. The 420 ft. hull is then raised by seven hydraulic jacks and moved laterally to a turning jig, the second stage, which brings the hull to an upright position. Another lateral shift, the third stage, and the prefabricated bow and stern sections are added and major machinery, electrical components, and piping runs installed. At the next lateral shift, the fourth stage, the prefabricated superstructure is welded to the hull and painting started. A final lateral shift and the vessel is at the fifth, and launching stage which takes place after propellers, radar, electronics, etc., have been fitted.

As the first hull progresses from the first to the second stage, a second hull will be started on the inverted system, so that by the time the first vessel is ready for launching four other DE's are simultaneously advancing through the various stages of construction, and preparations will be in hand to start the sixth. By these means, Avondale will be able to launch a DE every six weeks despite only having three building ways.

Sabmis

Amongst all the talk in America these days about Anti-Ballistic missiles one concept is a sea-based ABM, known as SABMIS.

The idea would be to install missile launchers in surface ships and nuclear submarines and to station such craft around the coasts of the U.S. and/or her allies facing nuclear attack.

The number of ships to be fitted has not yet been decided and indeed the project has not even been approved, but the Hughes Aircraft Company and Lockheeds have been given a preliminary six-months study of the system.

Presumably, if the ships could also be used to protect America's allies, she would expect a financial contribution towards its development.

New Gun

Brief details of a new American naval gun have now been released. It will be a 5-inch, 54-calibre, lightweight gun, said to be one-third the weight of the existing 5-inch gun and about one-third the size.

It is fully automatic and has a new fire-control system using solid-

late electronics. The whole mount can be operated by only one man and it is designed for use in the U.S.N's new destroyers.

Ferranti Action Speed Tactical Trainer

In collaboration with the British Admiralty Surface Weapons Establishment, Ferranti are to supply a complete Action Speed Tactical Trainer for exercise simulation involving realistically represented ships, aircraft, submarines and weapons. The system will handle any type of vehicle or situation — present or future, real or imaginary — keeping naval commanders fully conversant with rapidly changing tactical developments.

The equipment comprises three Ferranti F1600 computers and over eighty CRT displays. Students are accommodated in twenty cubicles, each cubicle representing a ship, submarine, aircraft or helicopter, which move through the exercise area with realistic response to movement commands and changes of speed. Information in the form of labelled plan displays, letters, figures or symbols appears on two or more plan displays and a tabular display: the cubicles also contain two keyboards for communication with the computer, facilities for limited-range voice channels, and switches to control sensor equipments: radar, sonar and data automation. The F1600 computers evaluate the effects of decisions taken by the students and modify the displayed information as required. From this modified information the student must then make the next series of decisions.

To achieve absolute realism the system allows for the limitations of the sensors. Only radar contacts that would be made in the field are represented on the cubicle plan display, which takes into account the target size and height, the range, the bearing of directional radar and any jamming in the area. The exercise can take place in real-time, or parts of it may be speeded up by factors of two, three or four. It is also possible to stop the exercise, in which case all vehicles retain their positions without drift.

The instructors are housed in a separate room, having similar facilities to those in the students' cubicles. In addition, two photographic projection displays on cinema screens portray the overall tactical situation, and these are supplemented by detailed pictures on individual displays. A large number of additional vehicles can be simultaneously controlled by the instructors, using manual control, computer-assisted control or fully pre-programmed movements. These very comprehensive facilities enable a small number of instructors to exert proper control over the most complex of exercises; and to intervene at any point to ensure that the right lesson is learned.

The F1600, on which the Action Speed Tactical Trainer is based, is a stored programme computer of very high speed employing silicon NOR logic, developed by Ferranti Digital Systems Department for real-time military and civil data processing applications. Ferranti are the largest single manufacturer of micro-circuits in Europe, and have the experience and large-scale resources to produce computer systems to meet specific Service requirements.

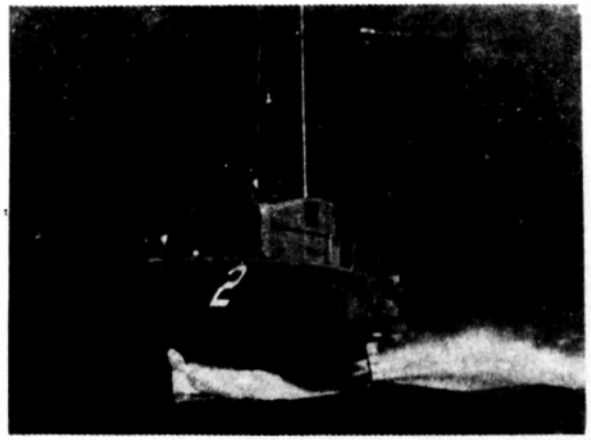
Water Jet Hydrofoils

The Boeing Company of America has built a new type of Hydrofoil Patrol Gunboat, P.G.H. 2, which is propelled by water jets. The boat, the TUCUMCARI, uses water jets as its main source of propulsion for both hull-borne and foil-borne operations, and is said to be the first naval craft to use this method.

A water jet works on the same principle as an aircraft's jet engine. The water is sucked in by a large pump, driven by a gas turbine engine, and is expelled through nozzles under the stern. TUCUMCARI'S pump is the largest in the world, and pumps 100 tons of water a minute (at speeds above 40 knots), about the consumption of a typical household for six months.

In the displacement (hull-borne) role, the main pump is not used, being replaced by a single diesel-driven smaller water jet pump.

Water jet systems are of great interest to marine engineers. They eliminate the complicated transmission required by propeller craft; lubrication of many moving parts



The U.S.N.'s hydrofoil gunboat, TUCUMCARI, at 40 knots on trials near Seattle, Washington.

is not required and the propeller cavitation problems are avoided.

TUCUMCARI is 72 ft. long, 19 ft. 6 in. beam and a draught of 4 ft. 5 in. (foils up) and 13 ft. 11 in. (foils down).

The 58-ton displacement craft carries one 40 mm. gun, an 81 mm. mortar and two sets of twin 50-calibre machine guns.

Deep Submergence

The U.S. Navy is ordering a Deep Submergence Search Vessel (D.S.S.V.). A constructional contract is expected to be issued about mid-1968. When completed, the D.S.S.V. will be a unique vessel, the first of a sophisticated, manoeuvrable class, able to descend to depths of 20,000 ft. and to perform search and rescue operations at this depth.

FDL Ships

Some details of the U.S. Navy's proposed Fast Deployment Logistic ships have now been released. They will be used as large, fast, non-combatant cargo ships to carry military equipment to support air-lifted Army Divisions. They will be capable of off-loading their 10,000 tons of military cargo, including wheeled and tracked vehicles, without dependence on a port or existing handling facilities; in other words, "over the beaches".

The F.DL's will be 848 ft. long, 104 ft. beam, and will draw 28 ft. of water. Their displacement will be 40,000 tons, and they will have a speed of 24 knots with an endurance of 8,000 miles.

Advanced Radar Systems

USN has placed an order with Hughes Aircraft for a further four AN-SPS-52 shipboard advanced radar sytems, bringing the total order for USN employment to seven, and the overall Defence order to 14. Six of the previous ten ordered are installed in five US destroyers and at the USN Training School Command, Mare Island, San Francisco. Three of the others were for Royal Australian Navy guided missile destroyers, and one is in an Italian destroyer. The latest order covers installations in three warships intended for West Germany, and one in a USN guided missile destroyer escort vessel.

Navy Studies Sub-Launched Mines

The Navy has launched a highly secret programme to develop a new generation of mines that could be shot into enemy harbours by a submarine. The project, nicknamed SLIM for "submarine launched mobile mine," will run into the millions of dollars if the Pentagon approves it after looking at forthcoming designs.

The advantage of such a system is stealth. A submarine could stay submerged a long distance from the harbour while mining it. The mines are put inside torpedo-like cases and shot out of the submarine's torpedo tubes. An electric motor would drive the mine to its position in the harbour bottom.

The Navy mined rivers in North Vietnam by dropping mines, with parachutes attached from airplanes. Navy officials said SLIM was not prompted by any need of the Vietnam war.

The Navy officials instead portray SLIM as a programme to equip submarines with something better than the first generation Mark-27 submarine mines now available. The new mine would have all types of sensors so that it could pick out the type of ship to explode under. The launching platform would be some of the 77 diesel-powered subs the Navy still has in service. There are some Navy leaders who would like to go beyond just a new kind of mine, and build new launching platforms for them. But SLIM at present is not that ambitious a project.

U.S.S.R.

Boost for Red Navy

Nuclear torpedoes have been created for the Soviet Navy, Fleet Admiral Vladimir Kasatonov stated recently.

In an article in the Soviet Government newspaper, "Izvestia", he wrote: "Nuclear warheads have been created for both missile and torpedoes."

But he did not say whether the torpedoes were of the underwater or airborne type, or if the Soviet Navy was already equipped with them.

Research Vessel

The KOSMONAVT VLADIMIR KOMAROV, a Soviet research vessel, was recently built at a shipbuilding yard in Leningrad. Reportedly, she will do experimental research on the upper layers of the atmosphere in the tropical zone of the Western Atlantic (see photo).

Hobart's Name Carried By Eight Ships

By JACK MILLAR

The guided missile destroyer H.M.A.S. HOBART is the second man-o-war and the eighth ship—naval and merchant—to proudly carry the fair name of the city and port of Hobart. Along with her sisters, PERTH and BRISBANE, HOBART will provide much of the power-packed punch so necessary to today's modern missile age navy.

Built in America by the Defoe Co. at Bay City, Michigan, at a cost of $40 million dollars, the HOBART carries a normal complement of 20 officers and 313 men. Hobartians are mighty proud of "their" fighting ship, strikingly evidenced by the many thousands who have flocked to the waterfront for a close look at the latest addition to the R.A.N.

Some thought of other ships with the name HOBART. A few, with memories more poignant, actually served on them.

Like the sailors from the first H.M.A.S. HOBART, which emerged from the Second World War with colours flying high, having built up a reputation for fighting efficiency second to none. Wherever the fighting was thickest, from the Mediterranean to the Pacific, this 6-inch gun cruiser was there, guns blazing, playing her part nobly and well.

Following Italy's entry into the war, HOBART took troop reinforcements to Berbera, British Somaliland. Ashore, the enemy's weight of numbers drove our forces back. Following a request, three volunteers from HOBART'S crew were sent into the hills to help plug the gap. Their armament — an old 3-pounder Hotchkiss gun—one used for saluting purposes. Not until every round had been expended did the army surrender. The three sailors, all mentioned in despatches, were the first Australians to become prisoners-of-war.

HOBART'S old Walrus amphibian spotting plane, with a top speed of only 130 m.p.h., was pressed into service. Ill-equipped for bombing missions, the plane was nevertheless loaded up and, thanks to the pilot's daring, pressed home a successful attack on the nearby enemy held town of Zeila.

When the inevitable evacuation came, HOBART was there, ready to embark the troops. Captain Howden, to maintain communications and discipline, sent some of his sailors ashore to direct operations. Order was created out of threatened chaos.

When all were aboard the ship, HOBART'S guns turned on the town. Nothing worthwhile must be left for the enemy. First Government House, then the Police barracks, storehouse and Government offices crumbled. Not until all were razed did HOBART steam away.

Diggers speak with pride of the HOBART as one of the ships which bombarded the Bardia-Tobruk road in late 1941.

Following Japan's entry into the war, HOBART was in the thick of many actions in the Singapore area. One of the last ships to break clear, she brought to safety 512 refugees, which included some women and children. A veritable angel of mercy, HOBART roamed the wide Pacific seeking out the enemy wherever he may be.

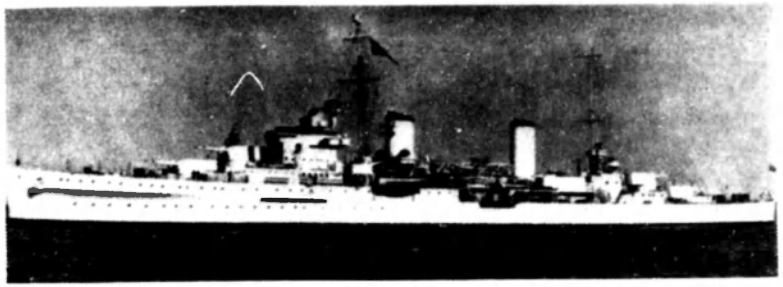
Unlike her two valiant sisters, SYDNEY and PERTH, HOBART survived the war, and was in at the kill to witness the main Japanese surrender in Tokyo Bay on 2nd September, 1945. She spent her last years in honourable retirement before being finally broken up for scrap.

Of the merchant ships named after our city, the one which endeared herself most to the people was undoubtedly the first. This was the sleek little 645-ton iron steamer, CITY OF HOBART, the only one locally owned.

Built at Glasgow, she arrived at Hobart in July, 1854. Crowds flocked to the waterfront to welcome the second ship of the newly formed Tasmanian Steam Navigation Company. The first, which arrived in Hobart in 1853, was appropriately called TASMANIA.

These were the leisurely days of the horse and buggy, when a visit to the waterfront was a chance to

H.M.A.S. HOBART, one of three of Australia's new guided missile destroyers.



H.M.A.S. HOBART, of World War II fame.

see and be seen affording the opportunity to exchange pleasantries with friends from near and far.

The CITY OF HOBART evoked much favourable comment. "Isn't she a fine cut of a ship? Look at that beautiful clipper bow and three masts, square-rigged, on the fore. Don't those painted gunports along the sides enhance her beauty? (These were a carry over from Nelson's time). Fancy! Two funnels, too!" (She was the only ship of the company to have two funnels.)

With a speed of 13 knots, she was one of the fastest ships of her day.

Before entering service, she was beached at Cornelian Bay for survey and re-painting.

Although mainly on the Hobart-Sydney run, the CITY OF HOBART ran to Melbourne on occasions, and during the 1860's made many trips to New Zealand, proving a most popular ship.

The first of these was memorable —with troops to New Plymouth for the Maori War. The charter sum was £3,500, for which the company had to provide fuel, food, cooking facilities and lighting, as well as carry 300 tons of coal for army use. It was a condition that the troops be landed as soon as possible, weather permitting, otherwise the company was liable to a £150 penalty per day for each day's delay.

Following the discovery of gold at Otago, the CITY OF HOBART was crowded with gold-seeking passengers from Hobart and Melbourne. On one voyage the CITY OF HOBART and the steamer OMEO — both bound for Otago — collided in Port Phillip on October 1st, 1861. OMEO went aground, but was later refloated. Badly damaged CITY OF HOBART returned to Melbourne. After repairs, both ships resumed their voyage.

When the gold petered out, CITY OF HOBART brought many of the miners back. A few were richer, but most were sadder but wiser men.

In 1862 she cleared Wellington an hour behind the crack steamer ALDINGA. It was neck and neck across the Tasman; rivalry between the two crews was intense. Approaching Bass Strait, CITY OF HOBART gradually overtook the ALDINGA, to enter Port Phillip Heads a few hours ahead of her rival. ALDINGA'S bunkers were swept clean to get her to Melbourne.

With newer ships coming on the run, the CITY OF HOBART was sold to a Sydney firm in March, 1875. She was placed in the Newcastle-Melbourne coal trade. She did not last long. In July, 1877, while in Bass Strait, the CITY OF HOBART'S tail shaft broke, puncturing her hull. Unable to contain the inflow of water, she filled and sank, her crew being rescued by the steamer BARRABOOL.

Shortly after the turn of the century, the Melbourne Steamship Company named one of their steamers HOBART. Built at West Hartlepool, the 2463-tons HOBART was registered in Melbourne in 1902. She carried some passengers

Along with her consort, MEL-

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BOURNE, PERTH, SYDNEY and BRISBANE, she operated in the interstate trade, ranging from Brisbane to Adelaide, with frequent calls at Tasmanian north-west coast ports.

The MELBOURNE was later bought by the Tasmanian Government, and operated by them from Hobart to the mainland.

In 1924 the Melbourne S.S. Co. sold the HOBART to the Japanese, who re-named her FUSHIMI MARU.

One foreign company — the German Deutsche-Austral Line, named one of their cargo vessels after our city. This HOBART (without any trimmings) was of pre-World War I vintage.

She came to a sticky end — so far as the Germans were concerned. Without wireless, and blithely unaware that war had been declared, the HOBART arrived off Port Phillip Heads on August 11th, 1914 —a week after hostilities had commenced. An astute bluff on our part inveigled the ship through the heads, where she was quickly captured. Capture of the HOBART'S secret documents intact allowed our forces to decipher all messages sent to German merchant vessels until the code was later changed.

The HOBART was re-named BARAMBAH and served the Allies as a troop and cargo carrier throughout the war.

In 1925 the Commonwealth Government sold the BARAMBAH to the German Norddeutscher Lloyd Line, who re-named her JUSTIN. She was broken up in 1935.

The first PORT HOBART of the Commonwealth and Dominion Line (now the Port Line) was one of their earliest motor-ships. She was also the first ship of the line to fall victim to an enemy raider. As Port Hobart approached the Caribbean on November 24, 1940, she was intercepted by the German battleship ADMIRAL SCHEER.

Hopelessly outgunned, she was quickly sunk by time-bombs and gun fire. Passengers and crew were imprisoned on the ADMIRAL SCHEER until transferred to the supply ship NORDMARK, camouflaged as the "DIXIE" under United States colours. Eventually landed at Bordeaux, they spent the rest of the war in a prison camp.

The second PORT HOBART, still in service and a frequent visitor to the port after which she is named, was built towards the end of World War II. Originally fitted with austerity accommodation for 120 passengers, this was removed shortly after the war's end to make way for additional cargo space.

The last ship to be named after our city is the Blue Star Line's HOBART STAR. She, too, is still in service, carrying Australia's produce and our fair city's name to the ports of the world.

The HOBART STAR briefly made headlines on July 13, 1963, when she broke adrift from her Port Melbourne berth in a gale and became firmly wedged in the mud for five days. Tugs eventually refloated her.

There has not been a Tasmanian owned ship named after our city since the CITY OF HOBART drifted from the scene 89 years ago.

Turning to aircraft, we find one of the earlier planes of Holyman Airways was the MISS HOBART, while today the CITY OF HOBART is one of the latest additions to the expanding Qantas fleet.

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