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For Sea Cadets

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THE NAVY

April - May, 1957.
NUCLEAR PROPULSION

By the announcement on February 18 of the creation of a new post, that of Rear Admiral Nuclear Propulsion, the Admiralty has given an encouraging expression of its belief in the vital importance, both to the Royal and Merchant Navies, of the early development of nuclear propulsion for ships.

The official designation of the new post is Deputy Engineer-in-Chief (N) and Rear Admiral Nuclear Propulsion, and its first holder is Rear Admiral G. A. M. Wilson, who took office from the date of the Admiralty announcement.

Rear Admiral Wilson joined the Royal Naval College, Dartmouth, as a Cadet in 1920. He was promoted to Commander in 1940 and from 1941-1943 served as Engineer Officer of H.M.S. Berwick. In 1943 he joined the Engineer-in-Chief’s Department and was responsible for the design of machinery in aircraft carriers including the Ark Royal, and the Eagle.

He was promoted Rear Admiral on December 12, 1955, and joined the Engineer-in-Chief’s Department, Admiralty, as Deputy Engineer-in-Chief for Fleet Maintenance and Administration, in which appointment he has served until February 18.

The establishment of the new post caused surprisingly little Press comment in London.

Most of it dealt with the lead established by America in nuclear propulsion. The “Scotsman,” however, took the line that, although the United States had two atomic-powered submarines already at sea, the installations in these two vessels were hopelessly uneconomic.

On the other hand, the experimental work going forward at Harwell held out the prospect of evolving a system sufficiently economical to be of more immediate interest. The newspaper added:

“The Navy’s appointment of a Rear-Admiral, Nuclear Propulsion, has to be seen against this promising background. The Navy can afford to wait no longer. The wide powers given to Admiral Wilson suggest something like a crash programme to take our fleet into the atomic age as quickly as the immense problems of reactor, engine, and hull design can be solved in practice. Gradually from now on we may expect the uncertainty which has hung over the Navy for the past few years to dispel as the technical possibilities crystallize into something more definite. Atomic submarines carrying nuclear warhead rockets of moderate range can definitely be expected. Surface missile carriers of cruiser size are controversial—aircraft carriers much more so. Both show up far too easily on ultra-modern radar.

“While all this is important strategically, the greatest significance of the appointment for Britain’s future as a seafaring country lies in the close tie-up made between the naval and commercial uses of nuclear propulsion. Admiral Wilson becomes responsible also for its application to the Merchant Navy—a wise decision. It is better to concentrate what is essentially one job in one pair of hands. Any advance made in one form of use will benefit the other. With costs running still above what would be commercially feasible, the State had to make the first plunge. By this arrangement, money we should in any case have to spend on defence will also help our Merchant Navy to stay in the forefront—just as Calder Hall was an offshoot of the need for military plutonium. It is the most painless kind of subsidy, and something like it was badly needed.”

In a letter to “The Times,” Vice-Admiral B. B. Schofield, who was Chief of Staff to the head of the British Joint Services Mission in Washington from March, 1949 to November, 1950, said he doubted whether many people in Britain realised how long the U.S. lead was.

“While we are slowly and surely building a nuclear-powered submarine, in the United States the nuclear-powered submarine Nautilus has already steamed 50,000 miles without refuelling and work is-in progress on the construction of an aircraft carrier of 85,000 tons, a cruiser of 11,000 tons, and 15 submarines, all driven by nuclear power,” he said. "According to the Secretary of the Navy, by 1960 the formation of a nuclear-powered task force will have begun and by 1970 the United States will have a nuclear-powered fleet.”
Australia's Coastal Ships

BY CLIVE TURNBULL
(In the "Vacuum Review")

Australians, like their ancestors from the British Isles, have the sea in their blood. In the pioneering days, the long voyage out was an adventure of the highest order, often hazardous in the extreme as the grim record of Bass Strait bears witness. Stout ships and expert seamen were needed to survive the perils of uncharted waters and unmarked reefs and promontories. The hazards have been removed by modern aids to navigation and a great coastwise trade has developed with the years.

Almost all the early Australian settlements were ports, and for many years the only link between them were seaways. Though the nature and functions of Australia's shipping fleet have changed with the years, its importance, notably as a cargo carrier, remains.

The industry, which has seen many economic fluctuations and not a few periods of crisis, has proved itself to have the virility to adapt itself to altered needs.

Many of these changes have been implicit in such fundamental developments as the transition from sail to steam and from coal to oil as fuel, and in the development of alternative systems of transport—rail, road and latterly air.

Nevertheless the basic advantages of sea transport, particularly for the carriage of bulk cargoes, remain dominant. If some of the picturesque scenes of other days have gone, the vital function of transport is being fulfilled with as much initiative as in the years when the shipping advertisements covered the front pages of every Australian newspaper and the whole community's interest centred upon the affairs of the port.

Seven Ships

The ups and downs of the industry are illustrated in some figures brought together by the late Dickson Gregory, a well-known historian of the sea.

In 1844 the entire steamship fleet in Australasia consisted of seven vessels, with an aggregate tonnage of 1,102. By the 'sixties and 'seventies a large number of steamers were engaged in trading between the different colonies and New Zealand, with which there have naturally always been the closest links.

Despite railway competition in the service of ports previously linked only by shipping the industry continued to grow.

In 1914, just before the outbreak of the First World War, when the population of Australia was about half what it is to-day, the numbers of passenger steamers reached its peak.

No fewer than 31 high-class steamships with gross tonnages ranging from 2,000 to nearly 10,000, with an aggregate of 151,071 tons, supplied the needs of the Commonwealth.

The requirements of maritime awards, industrial troubles and the operation of the Navigation Act, however, all had their effect upon the mercantile marine. Many steamers were dismantled, not because they were no longer useful but because alterations officially required would have been unprofitable.

Many were gradually disposed of and others, wrecked or lost during the war, were not replaced.

By 1927 the number of interstate passenger vessels had dwindled down to seven — the same number as in 1844 — with an aggregate tonnage of 56,166. Such was the position when Gregory wrote in 1928, nor has that particular story ended yet.

Household Words

The names of the pioneer shipping companies are household words in Australia, intimately linked as they are with the development of the nation. Of these may be noted the Howard Smith Company, which has its origins in 1834 as a pioneer of the Melbourne-Sydney trade; the Adelaide Steamship Company (1873), formed to cater for the Adelaide-Melbourne trade; Huddart Parker Ltd., which, originating in Geelong in the 'fifties, expanded into the intercolonial trade; and the A.U.S.N. Co. of London, which operated from Brisbane.

Later comers included the Melbourne Steamship Company and Mellwarth, McEacharn. With these must be linked the Union Steam Ship Company of New Zealand. Companies associated with particular regions include Burns, Philp, in the Islands, and William Holyman in the Tasmanian trade. The Colonial Sugar Refining Company Ltd. and the Broken Hill Proprietary Company Ltd. are important shippers in their own right. Among the later formed companies is James Patrick & Co. Pty. Ltd.

Great Ships

The names of many ships of the great days of passenger transport still linger in the memory of old-timers (and not so old-timers).
Many will remember the Union Steam Ship Company’s Rotoma-
hana, famous for years on both the New Zealand and Tasmanian
routes, for her beauty of line and her speed as well as, in more tech-
nical circles, for the fact that she was the first ocean-going steel
steamship built.

The Australasian Shipping News thus saluted her in 1879:

"The Rotomahana, now building for the Union Steam Ship Co.
of New Zealand, is intended to
eclipse, if possible, all the other steamers in these colonies, in
speed, accommodation for passen-
gers and comfort. A special fea-
ture in the new boat (apparently
it wasn’t a sin to refer to ships as
‘boats’ then) will be the ‘Bridal
Chamber’—a large cabin on deck.

After a long and honoured car-
cer the Rotomahana was sold and
broken up at Melbourne in 1927.

Mourned by shippers, who felt
that an era was passing.

In her day, the magnificence of
the Rotomahana was eclipsed by
that of the Karoola (McIlwraith,
McEacharn), whose luxurious fit-
tings astounded her three classes
of passengers before the First
World War. Even the Karoola
was outdone by the Katoomba,
used as a troopship and the first
steamship to navigate the Dar-
denelles after the Armistice of
1918.

Some of the fittings of the
Riverina were afterwards to be
seen in an East Gippsland hotel
and maybe still are. No doubt
after a fashion the passengers
enjoyed the experience.

Karlooa and Katoomba.

Even in modern times sea-faring
has not been without its share of
adventure. Many people will re-
nember the Riverina, one of the
most popular steamers on the
coast, which ran ashore in a fog
on a beach one and a half miles
west of Galiw Island in 1297.

The few residents of Malla-
osta, the nearest settlement, it
was said, were "surprised" when
they beheld the sight of a large
steamer ashore. This is putting it
mildly. The present writer, who
has vivid recollections of swim-
mimg a horse across the lagoon to
report the incident, was equally
astounded at seeing a large ship
in which he had lately voyaged
high and dry, and apparently
unharmed but stuck fast on the sand
while the passengers gazed won-
deringly over the side.

The growth of air transport and
the rejuvenation of various main-
land shipping lines has been a
cause for rejoicing to shipmen in all
parts of the world. Even in modern
times it is difficult to realise that
many of us seem to be in a hurry
as most of us seem to be in
modern times.

Even in modern times sea-faring
has not been without its share of
adventure. Many people will re-
nember the Riverina, one of the
most popular steamers on the
coast, which ran ashore in a fog
on a beach one and a half miles
west of Galiw Island in 1297.

There is even a tie-up with earlier
steamships, for Howard Smith’s first
steamship to navigate the Dar-
denelles after the Armistice of
1918.

There are many who travelled,
for instance, in such fine vessels as the Manunui, is due
not so much to the development
of other means of transport as to
causes within the industry itself.

The growth of air transport and
the rejuvenation of various main-
line railways have, in fact had
little effect on passenger ship book-

A Customs Department boarding inspector with opium valued at £5,700 which was
valued on board the "Gallahad" in Sydney. The six parcels of opium, weighing
13 lb, were one of the biggest hauls ever made by customs officials in Sydney.

Table: Constitution of the Fleet

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<th>Cargo only</th>
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The decrease in passenger ships,
and the decrease in the number of
boats on the coastal trade, is a
matter of deep regret to those
who travelled, for instance, in such
fine vessels as the Manunui, is due
ten not so much to the development
of other means of transport as to
causes within the industry itself.

The growth of air transport and
the rejuvenation of various main-
line railways have, in fact had
little effect on passenger ship book-

Table: Constitution of the Fleet

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April - May, 1927.
ings; except in off-seasons passenger ships are heavily booked. The trend however is for passenger vessels not to be replaced as they reach retirement age (25 to 30 years) and for an increasing emphasis on replacing old-age passenger vessels, to consider whether shipowners would be best served by such an investment.

The Committee of Inquiry into the Stevedoring Industry reported: "The level of profits in 1953/4, the year of highest profit, was too low to provide from that source the estimated replacement cost at the time of the flotilla of the private operators engaged in industry."

The average profit of the main operators engaged in the interstate trade, in fact, amounted in 1953/4 to 5.4 per cent of the original cost of their vessels and to 3.3 per cent of their estimated replacement cost. Such averages of course include vessels of the highest profitability as well as those of the lowest. Passenger-cargo vessels are among the lowest, and merely a statement of fact.

With regard to cargo ships we find that, although they are subject to the same trends within the industry as passenger-cargo ships, other factors also enter into the question. Whereas the demand for the services of passenger vessels, as such, has not been a factor causing change, the demand for the service of general cargo vessels has been, and still is, a significant factor.

With the rise of road and rail transport, general cargo has inevitably been taken away from the sea. Where many factors during the post-war period have increased costs directly to shippers and indirectly to the community. The way out of this present impasse is the building of ships which are not exclusively confined to use in the general cargo trade but may be used also for bulk cargoes.

A second bulk carrier will be designed later to meet the requirements of the next port to be shipped for bulk working. Orders are also going ahead for three vessels to replace others nearing the end of their useful lives. These vessels will be designed to meet the changing conditions of sea carriage and the different types of cargo now being carried and to be carried in the future.

The Union Company's new vessels will include the 5,100 ton bulk ore carrier Raseid, to engage in the movement of the Crom- lytic Zinc Company's cargoes between Tasmania and the mainland. Two new McEacharn, 3,450 ton motor cargo vessels will be used for the carriage of all classes of goods, including bulk sulphur. Howdard Smith Ltd. is likewise pursuing the matter of the construction of highly specialised modern cargo vessels. The 5,500 ton bulk carrier motor vessel Centaur has been specially designed for the carriage of zinc concentrates, coal, etc. The Australian Shipping Board (now the Australian Ship- ping Commission) recently stated that, in addition to 10 new merchant vessels to be added to its fleet before March, 1959, two 12,500 ton bulk carriers would be built.
station; the quantity of petroleum fuels supplied to shipping rose from 120,729,000 gallons in 1946 to 242,000,000 gallons in 1955, approximately double.

The petroleum industry is itself vitally interested in shipping and it is interesting to observe that its own pattern of bulk carriage is now being adapted over as wide a field to the needs of marine transport as a whole.

Such is the position of Australian merchant shipping today. Lines of vigorous development are indicated. What else the future has in store remains to be seen: the latest of reminders in the form of the Suez crisis and its aftermath has in store remains to be seen: the latest of reminders in the form of the Suez crisis and its aftermath has for the needs of marine transport a number of ventures by Australian ships beyond Australasian waters. These are questions inextricably bound in with national policy.

**New Training Machine**

An ingenious training device, designed by the Engineering and Materials Research Department of the Admiralty and known as the "Action Speed Tactical Trainer," has been installed at the Royal Naval Tactical School, Woolwich.

The new trainer was formally set in operation on March 6 by the Vice Chief of Naval Staff, Admiral Sir Wm. Davis.

The "Teacher" is a complex apparatus which, by electric and electronic means enables the tactical operation of ships to be reproduced, and provides Naval officers with the opportunity to exercise tactical skill in meeting situations that arise in active service conditions.

The installation consists of an auditorium with which are associated a number of cubicles fitted as control rooms to be used to represent surface ships, submarines or aircraft as may be required. The control of the exercises is conducted by the staff from the auditorium.

In setting an exercise the officer students are placed in two opposing teams and a tactical situation and objective is set before each of the directing staff.

The teams are allocated control rooms (cubicles) one for each of the craft engaged and each of the two team commanders formulates his plan of action based on the data and intelligence given.

In his cubicle each student controls the speed and course of his "ship" which is automatically plotted by the table.

Usual methods of sea communication enable him to plot the position of other craft and to transmit or receive orders.

Electronic coupling between cubicles provides him with a picture of the tactical situation within the detection range of his own radar and asides.

In the auditorium sit the director and directing staff acting as controllers or umpires.

Before them on a wall screen twelve foot square is plotted all the relevant information provided to the teams. It includes the data and intelligence given.

Electronic coupling between cubicles ensures that all pilots have full information on the detection range of the director or his assistants.

The director and his assistants are thus enabled to watch the tactical situation as it develops. Behind the screen members of the W.R.N.S. R.N. and other service personnel are present to record the course of each of the various units.

**FISH FROM THE OCEAN AREAS**

Great untapped resources of fish may eventually become available for food as scientific studies reveal new deep sea fishing grounds and more efficient methods of catching and preserving many varieties of fish.

Present, according to the Commercial Fisheries Service of the U.S. Department of the Interior, only five per cent. of the world's seas is being actively exploited. The Service also notes that 70 per cent. of the U.S. fish catch comes from surface waters, those up to 100 feet deep, while the remainder is taken from the shallow continental terraces out to about 1,000 feet of water.

Many other countries are fishing an even smaller proportion of their accessible waters.

Beyond these nearby grounds, and still unexplored by fishermen, are great ocean areas, which, experts believe, would yield rich harvests to vessels equipped with modern scientifically-designed gear and adequate refrigerating or canning machinery.

On the basis of exploratory studies by the U.S. Commercial Fisheries Service, it is believed that such a potential harvest is available not only in the deep seas of the Atlantic, but in the waters of many other parts of the world.

For a number of years the service has carried on a widespread programme of research in the Atlantic and Pacific Oceans. Essentially, its main purpose is to develop improved techniques for locating new sources of food in order to catch them. Its findings have already proved valuable technical data for all countries interested in developing their fisheries.

Offshore waters have in the past been regarded as barren of fish useful for food, in comparison with the organically rich and more easily accessible inshore waters.

New evidence suggests, however, that there are large quantities of such fish as ocean perch, hake, sardines, rockfish and salmon for out in the ocean.

This evidence includes the fact that the more than 3.3 million fathoming seals from the Pribilof Islands breeding grounds, which feed on the high seas, would require 3.5 billion pounds of food a year, which is in excess of the entire fish production along the Pacific Coast of North and South America, and obviously comes from waters not yet explored by modern fishing gear.

Studies of the stomachs of whales captured far out in ocean waters of more than 800 fathoms depth show that their diet includes young fish of the above-mentioned varieties.

Japanese reports to the International North Pacific Fisheries Commission also note that they take millions of salmon each year with gill nets dropped hundreds of miles beyond the continental shelf.

**UNDERWATER TV**

Such evidence is pinpointed and confirmed today by U.S. ocean-going trawlers and exploratory vessels equipped with such modern devices as lorans, radars, echo-sounding equipment, underwater cameras and underwater television.

Loran, an electronic navigational device, is now standard equipment on many off shore fishing vessels which find it essential for the accurate location of fishing grounds.

Radar, used for efficient and safe navigation and for locating surface gear, is another valuable research tool. Advances in echo-sounding equipment, according to a recent report by the Commercial Fisheries Service, have revolutionized some fisheries in the last decade, and are expected to play an increasingly important role in the exploration of the high seas fishery potential.

Electronic devices are helpful in offshore navigation for detecting fish and in studying the design of fishing gear.

Surface regions can be further investigated with various sizes of gill nets, seines, trolling gear and traps.

Sub-surface, or mid-water regions must be explored with high-speed large mesh mid-water trawls, sunken gill nets and long-line gear. (Experience has shown that mid-water trawls must be designed in a special way for each type of fish or fishery.) The bottom areas will be increasingly studied with deep-water commercial trawls.

All this research indicates that there is apparently no limit to trawling depths except that imposed by the physical capabilities of the vessel and its gear and the availability of deep-water species. Larger vessels with more powerful engines, bigger and better winches, efficient nets, stronger floats and improved navigating and echo-sounding equipment make this possible.

**Continued on page 10**
submarines, believed to be increasing at the rate of 60 or 70 a year, according to a pamphlet issued by the British Navy League.

The pamphlet, "The Danger by Sea," says the Soviet Navy has 30 cruisers of the Scudbrook class and will soon have another 10, and it describes these as "more heavily gunned and more modern than any British cruiser."

"This constitutes a threat vastly greater than Germany ever posed against us in the two world wars and one not less than the nuclear threat," the pamphlet adds. It says that does not believe the present British Navy is adequate for its task.

"No start has been made on the construction of vessels to carry guided missiles," it says.

"No postwar-designed war or cruiser has been laid down."

"Of destroyers, only the eight Daring class are of post-war design."

"An immediate programme of construction of ships for the Royal Navy cannot be delayed without the gravest risk to this country."

R.N. frigate programme speeds up

In Britain one more frigate was launched and two accepted into service during February, the Admiralty announced.

One of those accepted was H.M.S. Salisbury, the first ship of the Salisbury Class to be completed. She was launched in June, 1953.

Frigates of this class are designed primarily for the direction of carrier-based aircraft. They will also serve as small destroyers in offensive operations. They have been prefabricated in a manner to allow for rapid building and are all-welded.

H.M.S. Salisbury has twin screws and is powered by 10,000 h.p. six-cylinder engines. The hull was built at Devonport and machinery and other fittings were installed at Barrow.

In addition to her aircraft direction equipment, the Salisbury is armed with a twin 4.5 in. gun, mounting, two small additional guns and an anti-submarine three-barrel mortar. Her dimensions are: length (extreme) 340 feet, breadth (normal) 50 feet.

Normal peace-time complement is 279 officers and 325 men.

The seventh of the Blackwood class anti-submarine frigates, H.M.S. Russell, came into service on February 7.

The Russell was built by Swan Hunter and Wigham Richardson Ltd., of Wallsend-on-Tyne, and the main machinery and turbines by Mears, The Wallend Slipway and Engineering Co. Ltd.

She was launched at Wallsend-on-Tyne on December 10, 1954.

The Whitby Class anti-submarine frigate H.M.S. Blackpool was launched on February 14 at the shipyard of Harland & Wolff Ltd., Belfast.

Frigates of this class are of 370 feet in extreme length, 360 feet between perpendiculars, and have a beam of 41 feet. She has been primarily designed for the location and detection of modern submarines, while she is fitted with the latest underwater detection equipment and anti-submarine weapons of post-war development.

More U.S. guided missile ships

Contracts were awarded to the Albrook Cruise of U.S.S. Springfield and U.S.S. Oklahoma City to guided missile light cruisers have been awarded to the Bethlehem Steel Corporation, shipyard at Quincy, Mass., and the Albrook Cruise of Pacific Coast Steel Corporation at San Francisco, California, respectively, by the U.S. Navy, which announced that the vessels will be under construction.

The U.S.S. Springfield, to be converted to the CLG 91, will be equipped with the Terrier missile. The U.S.S. Oklahoma City, to be converted to the CLG 91, will be equipped with the Terrier missile.

Recruitment for 14 nuclear subs set

Of the total of 15 nuclear-powered submarines authorised for the U.S. Navy, contracts or project orders (in the care of Naval shipyards) have been issued covering 14 of these.

The U.S. Navy announced this recently when it revealed that the Newport News Shipbuilding and Drydock Company would build the SSN-591 nuclear-powered submarine at a contract price of 24 million dollars.

A U.S. Navy spokesman said: "The SSN-591 will be an attack submarine of the SSN-588 class. It has an Albrook Cruise hull and single screw. The Albrook Cruise offers the advantages of greater range, greater underwater speed, and improved manoeuvrability. A missile of that type and plant using pressurized water as a coolant will be installed in the vessel."

Go Down to the Sea in Ships...
U.S. SHIPS HERE FOR CORAL SEA WEEK

A U.S. Navy helicopter (right) hovers above the pilot ship "Captain Cook" as it leads the U.S. aircraft carrier "Bennington" to the Heads on April 30. The "Bennington" and three U.S. destroyers arrived in Sydney on a visit for the Coral Sea Week celebrations. American sailors (below) sunning themselves on the flight deck of the "Bennington" off the N.S.W. coast.
During the typical year of 1955 a fleet of five specially equipped vessels entered themselves of miles of Pacific waters in a study of the distribution, abundance and identity of salmon stock.

Other studies investigated bacterial diseases of fish, problems relating to Atlantic herring, yellowtail salmon, whiting, sea scallops and Gulf shrimp, and other matters concerning the culture and habits of fish.

Exploratory fishing operations in the Atlantic, Pacific and the Gulf of Mexico made discoveries of long range importance to the tuna fishery, and found new fishing areas for ocean perch, shrimp and halibut.

A special fishing gear research vessel was designed and purchased.

Other undertakings included the promotion of voluntary fishery product standards; research on handling, freezing and packaging of southern oysters; the development of an index for the nutritive value of fishmeat; the development of new uses for fish oil, and of methods of freezing catches of large tuna at sea.

The discovery of new fishing grounds and the development of new fishing and refrigerating techniques have already increased the supply of fish available in the United States.

As other countries benefit from these pioneering studies fish is likely to become a much more important item in their national food supply.

AUSTRALIAN LEAD ON NEW FISHERIES

INVESTIGATIONS which may lead to the development of valuable new fisheries are being undertaken with some of the money available from the recently established Fisheries Development Trust account, the Australian Minister for Primary Industry, Mr. William McMahon, said last month.

The Fisheries Development Trust Account was established under the Fishing Industry Act 1956 from the proceeds of the sale of the Whaling Commission’s assets in Western Australia.

In reply to a question in the House of Representatives, Mr. McMahon said a considerable number of applications had been received for assistance from the Trust Account.

Careful consideration had to be given to the type of project on which the limited funds available would be expended to ensure that maximum benefit was obtained from their use for the development of fisheries in Australian waters.

"So far, £100,000 has been allocated for a survey of pilchard resources off the coast of New South Wales. A purse-seine vessel has been chartered and is at present testing the commercial prospects of this fishery," Mr. McMahon said.

"Other prospects being investigated include an examination of the results of an economic survey of the tuna industry off the south-east coast of Australia by the Fisheries Division of the Department of Primary Industry," he said.
QUICK "FIX" FOR LOST NAVAL AIRCRAFT

The pilot of a Naval aircraft, possibly flying at ten miles a minute, who asks for a "fix" by radio-telephone can now be given his position within five seconds. This method has been made possible by the introduction of the Fleet Air Arm of the first two automatic fixer stations for Service aircraft in Britain. Officially known as the Southern and Northern Fixers, they have their central located at the R.N. Air Stations at Yeovilton (Somerset) and Abbotsinch, near Glasgow, respectively.

In fact there are fewer than forty ports where these drydock facilities exist in the entire world.

Need of substantially enlarged drydock arrangements for these new giant ships has already been stressed by the U.S. National Petroleum Council's special committee on tanker requirements. It may go without saying that provision of these facilities, together with whatever general port improvements may also be necessary to accommodate such ships, is bound to be a tremendously costly undertaking. Yet, once installed, these amenities might attract an enormous volume of work to the ports able to offer such repair services.

Since the trend in the oil-company and private charter tanker fleet is so clearly moving towards an increase in the size of individual vessels, ability to carry out overhauls and repair work should be ensured at as many U.K. shipbuilding centres as possible. Otherwise, Britain looks like missing a substantial volume of valuable future business to competitors overseas.

- From Petroleum Information Bureau.
Thirsty! Take the necessary Schweppes

through the sound barrier by Neville Duke, interviews with Chris Chataway, Tommy Newdell and Freddie Mills, camping hints, and a chapter of "Things to do in the open air." It is a real sort of book for nearly every boy.

The book takes you from the primeval oceans through countless evolutions until we arrive at sea life as we know, or could know it today.

Man adventures forth in a canoe, and through his various vicissitudes we arrive at some understanding of what lives on the ocean bottom and how today he has arrived at scientific navigation.

If this book was to be given to the head of the family, it would be seized by "Junior" — and vice versa.

— G.A. in the London "Navy"
While we are getting increased rates of passage money and freight and offset the increase in operating costs, the less on
route earnings, from Ceylon and the Mediterranean, was not taken into account when the scale of inc
creased was calculated."

No Jap ships in H-bomb area
The Japanese Government will not "protest" ships sail from Japan to the Christmas Island nuclear test danger zone.
Announcing this in the Diet, the Prime Minister, Mr. Nobusuke Kishi, said that a "hit and run" protest would endanger life and would be against commonsense.
Mr. Kishi's personal envoy, Mr. Masatoshi Matsuoka, arrived in London on April 1 to appeal for suspension of the scheduled British nuclear tests at Christmas Island.
Mr. Kishi told the Diet that Japan would await the results of Mr. Matsushita's appeal before taking any further action.
The Japanese Council Against Atomic and Hydrogen Bombs recently decided to send one or two ships to create just outside the British designated danger zone.
The Alliance Against Atomic and Hydrogen Bombs in Shikoku, southern Japan, proposed the sending of a fleet of fishing boats to Shikoku into the danger zone.

In recent years there have been more passenger ferries, cruises, and small craft. A marine is basically an infantryman, but he has special skills to suit him for his special role as a "sea soldier." His training is consequently long and arduous to make him the proud member of a corps different from the others.
He starts at the age of 17½ as a recruit at the Depot at Deal. Here in fine modern surroundings he acquires some of the alertness and smartness of the hallmark of the trained Marine, by knowing the thing of the history and traditions of the Corps.

Another Cunard liner, the Queen Mary, carrying 1,750 passengers, on April 1 ended her crossing from New York to Cherbourg, France, instead of Southampton.
Unions at Southampton consequently boycotted on the liner for "breaking" the shipyard strike at Southampton by sailing while on overhaul.
Another Cunard liner, the Ivernia, took the Queen Mary's passengers to Plymouth.

**SOLDIERS WHO GO TO SEA**

**BY PENGUIN**

The motto of the Royal Marines, Per Mare, Per Terram, "By sea and land,” broadly describes the functions of this Corps, ten thousand strong, which provides highly trained infantry soldiers to serve in Her Majesty's ships, in Commandos, in landing craft and small boats and which provides the Royal Marines Band for the fleet and shore establishments.

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This year, according to Lloyd's Register of Shipbuilding Returns for the year, we are getting increased rates of passage money and freight and offset the increase in operating costs, the less on route earnings, from Ceylon and the Mediterranean, was not taken into account when the scale of increase was calculated.

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The Commandos are trained to make small team raids, either by fast small boat, submarine, or dropped by parachute from aircraft. At least one special boat section will always be found operating with Commando Brigade.

Admiral Harrington is New F.O. Eastern Area

CAPTAIN W. H. Harrington, D.S.O., R.A.N., until recently captain of the aircraft carrier Sydney, has been promoted to the rank of Rear Admiral.

In March he assumed the appointment of Flag-Officer-in-Charge, East Australian Area. Admiral Harrington, a graduate of the Royal Australian Naval College, has had a distinguished career. In the Second World War he was awarded the Distinguished Service Order for courage, enterprise, and devotion to duty in operations in the Persian Gulf and was twice mentioned in despatches.

Admiral Harrington was captain of the HMAS Yarra, which served in the Mediterranean, the Red Sea, the Persian Gulf and the East Indies. When the Battle of the Coral Sea was fought he was executive officer of the cruiser Australia.

At the time of the award of the D.S.O. he was captain of the aircraft carrier Sydney, has been promoted to the rank of Rear Admiral. Admiral Harrington is New F.O. Eastern Area.

Appointment


A simultaneous appointment was made by the Secretary General, North Atlantic Treaty Organisation, of Admiral Grantham's appointment to the N.A.T.O. post of Allied Commander-in-Chief, Channel.

Rear-Admiral H. P. Koeckie to be promoted Vice Admiral in Her Majesty's Fleet and appointed Director-General Supply and Secretariat Branch, in succession to Vice Admiral Sir Maurice H. Elliott, K.C.B., C.B.E., (August).

The following change in the Flag List is announced:

Mr. A. E. Gregory has been appointed Manager of the N.S.W. branches of Matson Lines, Pty. Ltd. He was formerly General Manager of Siemen Brothers & Co., Ltd.

Matson Lines

Mr. Harry A. Johnson, Matson Lines' general manager for the South Pacific Area, has been appointed area vice-president for the company in Hawaii.

Mr. Johnson joined Matson Lines in 1932 and, after important assignments in America, was transferred to Sydney in 1952.

Mr. T. E. Rowe, who recently visited Australia on the maiden voyage of s.s. Monterey, will succeed Mr. Johnson in the Sydney office. Mr. Rowe, who joined Matson Lines in 1949, has been vice-president in charge of marine operations.

R.N. appointments, etc.

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THE GREAT SHIPS

by R. J. HUSSAN

MORE than a million is the
figure given for visitors to
Britain last year. Perforce they
came by sea or by air. And whilst
even we, the natives, relish the
terrible advertisements to come
here, there seems to me to be no
reason why we should do so as to how to leave.
Surely, the last moment ought
to be the abiding one. And from
that, at this Christmastide season
of wishing, it is an easy step
over to as to what is the best
point of departure.

Personally, I love the trains:
things that move in "predestinate
storage." So, no night train to
Paris for me.

The air travel: apart from very
occasionally exceedingly interesting
moments, air travel is dull. I re-
member flying from Montreal by
BOAC several years ago and we
made the journey to London
direct in a shade over 10 hours.
Said a fellow bored traveller as
we landed: "To think a piece of
tin could stay in the sky so long!"

Now, of all the possible sea
ports I would choose, Plymouth
wins by far. As the ship turns
her bows to the mighty heave of
the Channel, anyone with red
blood must feel a sense of romance.
This was the route, one can say,
that Drake took against the Spani-
ards in 1588—outward bound on
the great adventure that was to
be one of the decisive battles of re-
corded history—the defeat of the
Great Armada, 1588.

Long before then Drake had
established his fame as a sea man.
It was in 1577 that he sailed from
Devon and returned to England
three years later having circum-
avigated the globe. A fine and
splendid thing, but a personal
triumpg rather than the national
victory against the Spanish
which he played has been a

We can leave to the Hoe
the legend of the game of bowls, and
turn to reflection on the changes
in the warships since Drake's
days at Plymouth.

Well, the sea has not changed
at all: "There's never a wave of
her waves. But it marks our
English dead," wrote Kipling, and
the character and courage of the
men who sail to-day across the
Sound differs little from yester-
year's. So it is not so far away: if 70
years be taken as the span of life,
then only five such lifetimes ago
did Drake sail from Plymouth.

One of the ships which sailed
to fight the Spaniards was the Ark
Royal. It happens that the mod-
ern Ark Royal is a Plymouth ship,
so it might be illuminating to make
a comparison.

The Bowl's Legend

In 1588, the British Fleet was
dispersed along the Channel, but
the main body was at Plymouth.
There, for many months, all man-
er of rumours had been current
as the summer came on. (These
may explain the bowls legend: fed
up with constant alarms and excu-
sions, Drake probably decided
to take a chance—just as at
Dunkirk—sail, and if he finish-
a game of darts when the air raid
sirens sounded.)

The Great Ship of the British
Fleet was the Triumph, of 1,100
tons—about half the displacement
of a modern destroyer. The flag-
ship was the Ark Royal, of 800
tons. Just to keep the matter
perspective from the start, that
anti-Armada flagship was 1/57th of
the listed full load weight of the
modern aircraft carrier Ark
Royal.

The qualifying adjective
"listed" is used because the official
figure of 46,000 tons would seem
to even amateur observers to be a
typically British understatement.

The crew of the 1588 Ark
Royal numbered 430. Of these, only
270 were sailers: there were
34 gunners and 126 soldiers. At
war maximum, the modern Ark
Royal has a complement (and she
might carry more) of approxi-
mately 2,530 inclusive of the air
squadrons which embark or dis-
embark as convenient.

Thus, the modern Ark Royal
has a war complement approxi-
mately five times as great as her
famous predecessor.

If you were on board the mod-
ern Ark Royal going out of
Plymouth you might like to re-
fect that the original Ark
Royal was built in 1587 at a cost of
£5,000. Just to make things easy
we will ignore the change in the
value of £ sterling, and any-
way all sorts of figures have been
quoted for the modern ship
which may have cost around
£20,000,000. At that figure, the
modern ship is thus 4,000 times
as costly as the first Ark Royal.

But, of course, every accountant
will assure you that longevity
comes into the reckoning. Now,
the original Ark lasted only 49
years, being broken up in 1636,
but Hawkins' Victory (which was
more representative of the period
in the shape of long service) was
built in 1561 and lasted for over
the line of battle until burnt out.

Continued on page 30

THE NAVY

April–May, 1937.
THE GREAT SHIPS
Continued from page 20
in 1666 in the Dutch war, being then 105 years old.

Another interesting comparison concerns the size of the main armament. The Great Artists averaged an almost identical array of weapons. They had four 60-pounders ("cannon") and four 30-pounders ("demicannon"). The secondary armament was 12 18-pounders ("culverin"); 12 9-pounders ("demiculverin"); and six 6-pounders ("sakers"). The total amounts to 680 lb. which, as everyone will know, is no more than a small bomb in the last war.

It is soon apparent that the comparison to be made is not between the one ship of today and of yesterday, but of the one modern ship of the entire British Fleet of 1958. In size alone, the largest of the British and Spanish warships was La Regazona of 1,249 tons. It carried only 30 light guns.

Perhaps the comparison is no more acute than in the search for renaissance characteristics. A month before the main battles, and even longer since the Great Armada had put to sea, the British and Spanish Fleet was not known to the enemy's whereabouts—except for some reports from fishermen who had run for land's end and reported with evident inaccuracy.

In the event, 40 Spanish ships lost contact with the main force shortly after the first action and the cause was, and this was the thrust which he sighted and led to the many shipwrecks in Plymouth. No such uncertainty exists today: even in thick fog the ship's radar would sweep 200 square miles of the sea on constant watch, whilst its aircraft in less than an hour would cover the same distance with 6,000 square miles on square search.

Nevertheless, the British Fleet was then sufficient for its task—even if the meaning of Sea Power was not fully understood, and some 800 tons in the last war. It was not a sufficient mind that Drake's Pelican (later The Golden Hind) was of only 120 tons . . . and if such a thuddler could master the oceans of the world what could not his great ship do?

Eight hundred tons? Why, since a Gannet aircraft burns about two tons of fuel on a four-hour patrol, the aircraft of the modern Ark Royal would consume 100 tons in the air. Furthermore, the cost of one modern aircraft fully equipped exceeds the cost of the entire main units of the British Fleet of 1588.

The Marin Abaran ship under Lord Howard of Effingham, and the majority of these were equipped with two ships. Only two British ships exceeded 1,000 tons: there was one of 900, two of 800, five of 500 tons, and the remainder were of 400 tons or less. The entire British Fleet was roughly one-sixth the size of the modern ship.

The Commodore of the Great Armada, Don Martin de Almada, states in a review of Sea Cadet activities for the last half of 1956.

This year's work ended with a three-day continuous training course for H.M.A.S. Penguin.

The programme included seamanship, signals, and recreational training. Swimming, tennis, cricket and deck hockey were arranged.

The Commanding Officer of the S.T. Condadine, Lieutenant H. Madge, was in charge of the course.

Other training courses in H.M.A. ships and establishments were held during the half-year.

Lieutenant-Commander Mort states that it is hoped that in the not far distant future sea cadets of suitable standards may, like the U.K. own, go to sea for training courses.

The annual athletic carnival was held in September at the Sydney Athletic Field and competition was keen. T.S. Albatross (Wollongong) and T.S. Tobruk (Newcastle) sent teams to compete.

The "Stamina" Cup for the aggregate point score was shared by Australia and Shropshire with 1012 points each. Each unit will hold the cup for six months.

The Division's annual swimming carnival was held on February 23, 1957, at the Balmoral Municipal Yacht Club on the outskirts of Sydney.

Trophies and prizes were presented to the winners by Rear-Admiral H. J. Buchanan, then Flag Officer in Charge, East Australian Area.

Among those present at the Adenown.

SEA CADET TRAINING REVIEWED

A.L. N.S.W. Sea Cadet units have maintained a steady strength of cadets in the Division. The Commanding Officer, S/C Lieutenant Commander D. J. Mort, states in a review of Sea Cadet activities for the last half of 1956.

This year's work ended with a seven days continuous training course for H.M.A.S. Penguin.

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Among those present at the carnival were Rear-Admiral H. A. Showers and Mrs. Showers, Rear-Admiral Moore, Captain Darling (H.M.A.S. Division), Commander and Mrs. Shoofield, and Lieutenant-Commander Whyte (National Service Training Officer).

The Navy League aggregate point score cup was won by T.S. Tobruk, with 45 points. The Australia was second with 42 points. T.S. Australia won the Sirius relay cup.

Appointments

The following appointments have been confirmed:

Captain Stanley Darling, R.N.R., D.S.C. (2 Bars), as Divisional Senior Officer, N.S.W. Division, A.S.C.C., vice S/C Lieutenant Commander Leonard Forstye, S.S.D.

S/C Commander Leonard Forstye, S.S.D., as Commanding Officer S.T.D. Snapper Island and T.S. Sydney.

Commander Ronald Denovan, R.A.N.V.R., as Deputy Senior Officer, N.S.W. Division, A.S.C.C., vice S/C Lieutenant Commander Leonard Forstye, S.S.D.


William Adey Buckley, as Sea Cadet Sub-Lieutenant and as First Lieutenant T.S. Shropshire.


Advancements

To Cadet Petty Officer: 1218 Robin Warren Castle (T.S. Sirius).

To Cadet Acting Petty Officer: 1577 A. D. S. Barlow, T.S. Shropshire.

To Cadet Leading Seaman: 1600 J. A. Hatton, T.S. Shropshire.

To Acting Cadet Leading Seaman: 1318 Trevor J. Fairbairn (Australia), 1161 Kenneth Allan McMath (Sirius), all to date January 1, 1957.

Entries


T.S. Sirius: 1599 W. A. Barry, 1600 S. J. Simpson.

SEALS—AND SEALERS

By ROY KINOHORN
(In an A.B.C. Talk)

WHEN I think of the hundreds of thousands of seals killed during the year 1887 and the skins sold on the London market (there were 226,000 killed that year) and the thousands killed every year since, it is a wonder that there are any left today.

There certainly would not have been, had not the United States government outlawed what was known as pelagic sealing more than fifty years ago.

Pelagic sealing was more or less bucaneering, because seals were not attacked on their way south, after breeding in the Aleutian islands, or off Alaska and Newfoundland, and set upon by the too eager sealers, who not only took males and females, but the young.

You can imagine how they were being ruthlessly slain, in fact they were being rapidly wiped out.

Actually, it is mainly the young unattacked males that are taken. They never having indulged in fights that would tear their skins about, and make them useless for trade purposes.

That reminds me that, when the seals gather on the islands where they breed, the older and more powerful males gather great harems of females, and guard them against all comers.

The males are called bulls, and the females cows, and the unmated males bachelors. But even though there are bulls and cows, strange to say, the young are called pups; so what a mix-up it is.

Under international agreement controlling sealing, about 40,000 are now taken yearly, and that should allow for the continuation of the species.

If you care for figures, here is a big one. It has been estimated that during the past 140 years, more than 40 million seals have been taken by hunters, and that is a lot of seals.

An adult fur seal, particularly the hooded and the harp seal, may measure up to eight feet from tip of snout to tail, and weigh up to four hundred pounds.

Whilst sealing is carried out mainly in the north, particularly in or near Hudson Bay, Canada, the position at present round the Antarctic continent is that all are totally protected now. I am reminded that some sixty years ago a well-known sealing area was on Kangaroo Island off the coast of South Australia.

Here again in the sealing industry we find some peculiar names. Male hair seals were known as bulls but male fur seals were called wigs, and all females, both fur and hair seals, were known by the extraordinary name of klappmatch.

Seals are extremely fast in the water, as you may have noticed if you had seen them in ponds at zoos, but they are clumsy on land. Even so they can cover a stretch of beach at a pace that would astonish you.

There are some well-known seal rookeries, or should I say sealeries, on islands off the Victorian coast, and in Bass Strait, where rookeries of up to 5,000 have been counted.

That may seem a lot, but seals will have to be in their hundreds of thousands before sealing will demand again in this part of the world, or they would be exterminated in a few years.

THE NAVY

NAVY'S BILL FOR SUEZ IS £2 MILLION

The cost of the Navy's part in the Suez operations has been set at £2 million.

This is shown in two White Papers concerning Navy finances, published in London in February.

They were a Supplementary Estimate for the year 1956-57 and the Navy Estimates 1957-58, the latter in the form of a "Vote on Account" as the full Estimate will not be presented to Parliament until later in the session, probably after the new financial year has opened.

The Supplementary Estimate, published by H.M. Stationery Office on February 13, asked Parliament to vote an additional £11,000,000 for the Navy.

The request for the additional money is mainly due to increased wages, prices and freight rates, plus £2,000,000 arising from the Suez emergency. On the other hand, certain additional liabilities have been partly offset by the assumption of further economies and the disposal of surplus stores, etc.

With the original net estimate for the financial year 1956-57 contained in last year's Navy Estimates of February 9, 1956, as amended by the revised estimate published in Command Paper 311 of June 27, 1956, the total net expenditure on the Navy for 1956-57 amounts to £348,840,000.

The original net estimate was £346,000,000. The revised estimate reduced this to £337,840,000 by means of effecting a number of savings in accordance with Government policy; and to this must now be added the supplementary requirement of £11,000,000.

NEW RESERVE SECTION

The formation of a new section of the Royal Naval Volunteer Reserve and of the Woman's Royal Naval Volunteer Reserve was announced in the House of Commons on February 13.

Its purpose is to provide a reserve of trained men and women living near Naval headquarters, to be immediately available in war to assist in manning the headquarters.

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THE NAVY

June, 1957.
In the past two years Australia has become an exporter of oil products. This has arisen from the establishment of oil refining here.

It is a significant development from the viewpoints of trade—including shipping—and defence.

It is of particular importance to New Zealand.

In 1955-56 Australia did not export any motor spirit or heavy oils to New Zealand. But in 1954-55 she was able to send New Zealand nearly 15 million gallons of petrol and 27 million gallons of heavy oils; and in 1955-56 57 million gallons—25 per cent, of her requirements in addition to supplying New Zealand with 27 million gallons.

By 1955-56 Australia—in just two years—had developed her oil products market to the extent where she was supplying 17 per cent. of New Zealand's petrol needs.

Australian exports of petrol have been limited only by the capacity of her refineries—which have not by any means reached their maximum output.

In the field of heavy oils the Australian export picture has been even more surprising. In 1955-56, in addition to supplying New Zealand with 27 million gallons—25 per cent. of her requirements—Australia sent 49 million gallons to Singapore.

Exports to all countries for that period totalled 107 million gallons.

As the refineries progressively increase their output Australia could well become the main source of oil products for a big part of the Pacific and South-East Asia.

For its size New Zealand has a relatively large market for petrol products. Much of this arises from the fact that New Zealand has more cars in relation to population than any country outside North America. In the past 10 years the number of vehicles in the Dominion increased from 200,000 to 410,000. In September last year there were 664,525 motor vehicles on the road which is about 19 cars for every 100 of population.

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The National Petroleum Council of U.S.A. recently announced that 24 tankers each of at least 100,000 tons d.w. are expected to be in service by 1965.

Australia now has large modern refineries at Kwinana, Western Australia, Geelong, near Melbourne, Altona, near Melbourne, and Kurnell, on Botany Bay, N.S.W. Australia's total refining capacity is 9,150,000 tons a year.

If oil is ever found in payable quantities here, Australia's significance as an oil supplier will be a mighty factor in trade and defence planning.

Meanwhile, shipping authorities are heavily occupied with plans for tanker fleets—which include ships of huge tonnage.

The National Petroleum Council of U.S.A. recently announced that 24 tankers each of at least 100,000 tons d.w. are expected to be in service by 1965.

The Council undertook a study of long-range tanker building programmes at the request of U.S. President Eisenhower.

The president said he wanted a clear picture of the free world's tanker strength before discussing plans for the possible construction of an American emergency oil fleet.

The council reported that in addition to the 74 super-tankers, there will be another 39 tankers of between 60,000 and 100,000 tons. However, the most fashionable size for new oil ships is between 30,000 and 40,000 tons, and 320 such vessels are either on order or are planned.

These ships will constitute part of the total tanker tonnage of 58 million which is expected to be added to the world fleet in the next eight years.

Allowing for scrapping and losses the additional tonnage will increase the capacity of the world's commercial tanker fleet by 80 per cent.

The council's survey showed that at the beginning of this year, the world's commercial tanker fleet excluding ships of Russia and her satellites—comprised 2,335 vessels of at least 6,000 tons. In addition, 992 vessels were on order or under construction and additional ships totalling 11 million tons were to be ordered soon.

The British Vice-Chief of Naval Staff, Admiral Davis, at a recent launching ceremony, reflected the concern felt by the West at Russia's submarine strength.

He said:

"It is a sombre thought but we are faced today with a formidable threat of over 475 Russian submarines—greater than the peak threat at the height of the German submarine campaign in the last war. We are a very important part of NATO and it is one of the charges on NATO to see that this island is supplied. If we don't keep the sea lanes open or show that we have the ability to do so in the event of war we will either star or increase the possibility of a global war.

"All the inventions in the world cannot get around the inescapable fact that we are more and more dependent on seaborne supplies for our existence as time goes by, and we perish if these fail.

"I forget who it was who said in the past that it is only numbers which annihilate, but in anti-submarine warfare that is abundantly true today.

"We must have adequate numbers of A/S vessels, A/S aircraft and other devices if we are to match up to the submarine threat.

"The importance of the naval threat is fully appreciated by those who rival us.

"Marshal Zhukov, the Russian Minister of Defence, warned the 20th Communist Party Congress: In a future war the struggle at sea will be of immeasurably greater importance than it was in the last war.

"I think we have the ability to do so in the event of war and I speak as a naval officer and as a man who has had the experience of the American submarine warfare that is abundantly true today.

"It is a sombre thought but we are faced today with a formidable threat of over 475 Russian submarines—greater than the peak threat at the height of the German submarine campaign in the last war. We are a very important part of NATO and it is one of the charges on NATO to see that this island is supplied. If we don't keep the sea lanes open or show that we have the ability to do so in the event of war we will either starvate or increase the possibility of a global war.

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The role of the Navy in the G.M. Age

By "LIAISON"—In London

In particular, the American antiaircraft guided missile has reached such a stage of reliability and effectiveness that various types are in quantity production and have been issued to all three of the United States Fighting Services. The American defence chiefs are indeed convinced that these missiles provide a sound defence against the bomber and that this need is urgent for another kind of explosive carrier to supplement, if not entirely to replace, the bombing aircraft. They have for several years been investigating two types of alternative long-distance explosive carrier—a winged missile propelled by a ramjet or other air-driven engine, on the lines of the German V-1 flying bomb; and that, with a trajectory beyond the atmosphere, a development of the V-2.

500 Mile Range

Considerable progress has already been made with the winged missile and two varieties of it, with a range of 500 miles, are now in use as an auxiliary to the main armaments of the U.S. Navy and Air Force—the "Regulus" in the Navy and the "Mistador" in the Air Force. Until comparatively recently efforts had been largely concentrated on increasing the range of these missiles and there are two types with an intercontinental (5,000 miles) range under development which show great promise as a weapon of the reasonably near future. All these winged missiles, however, though they can be guided throughout their trajectory, are air-driven and must thus remain within the atmosphere—below 100,000 feet. Moreover, with engines dependent on air, their speed is relatively slow—certainly insufficient to render them immune from anti-aircraft measures.

On the other hand, there are immense difficulties in producing a very long-range ballistic missile—seen in the inability of the materials at present available to withstand the heat friction developed when the missile is re-entering the atmosphere at speeds of something like four miles a second. The "Atlas"—a rocket of this kind with a range of 5,000 miles—now under investigation in the United States—is still in fact, very much a weapon of the remote future.

Latterly, however, two new developments have caused a marked revival of interest in the ballistic rocket and concurrently in the importance of sea power for the development which the former First Lord seems to have had in mind when he referred to the ballistic missile.

Tests have shown that both nuclear and even thermo-nuclear explosives can now be used in a warhead of reasonable size, which makes accuracy of far less importance.

There has also been very great progress in methods of combustion and propulsion and the American authorities now seem satisfied that the design of a relatively short-range rocket is, in essence, suitable for missiles of up to 1,500 miles range.

The Chrysler Corporation has, in fact, been given the contract for prototypes of the ballistic rocket "Jupiter" which has a range very much greater than the "Redstone," a one-stage rocket of the same design with a range of 250 miles, which is already in production. The "Jupiter" is to be tried out at sea in large merchant ships now being converted for the purpose.

Practical Considerations

In brief, priority is being given to producing what is at present practicable, leaving the intercontinental ballistic missile to be developed in due course as a weapon of the future. Rockets of up to 1,500 miles range to reach vital targets must be launched from positions off an enemy's coast and because of their size, require large ships to carry a worthwhile number.

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In producing the "Jupiter," is to be tried out at sea in two large merchant ships now being converted for the purpose.

The Americans have always in mind the fear that their land-based bombers may be partially or even totally destroyed by a sudden, unexpected attack and these naval bombers provide an alternative strategic bombing force.

What of the Royal Navy? Will its primary task in the missile era remain, as hitherto, to guard the sea communications? Or will the intermediate range ballistic rocket of the early future give a new impetus to the principle of hitting the enemy where it hurts him most?

The answer must clearly depend on whether we have, or can build, a home defence sufficiently effective to enable us to protect ourselves against or at least to endure the effects of hydrogen bomb or other thermo-nuclear missile attacks. But other considerations are also involved.

The Prime Minister in his broadcast, when taking office, emphasised that Britain has been, and, provided we pull together, will remain great. But with all due respect, is this possible unless we are also a great military Power?

There are no more deserving or go-ahead nations than Switzerland, Sweden or Holland. But have they any influence on the course of events except by their vote in the United Nations? Again, is there not a lesson to be learned from Suez? To stop a general conflagration in the Middle East and to produce a United Nations Emergency Force are results which need cause us no shame. But we were none the less prevented by the United Nations from finishing the job and its obvious that we shall have the greatest possible difficulty in the future in taking action to safe

Continued on page 12
WHAT CAUSES "ICE CYCLES"?

By Professor E. W. Titterton
In an A.B.C. broadcast

All glaciers move, even though very slowly, and to-day, most are retreating steadily. However, in the Pacific northwest some are holding their own, while a few have even begun to advance.

An interesting problem of current study is to search for a possible correlation between glacial history and long range weather patterns.

A glacier is a body of ice, at least 150 feet thick, originating carving out a U-shaped valley as it melts very slowly, and to-day, most of the existing mountain glaciers in the higher latitudes, and since 1900 we have been emerging from a "little ice age" into a period of gradually warmer temperatures.

What causes the rhythmic glacial tides that we know have swept over the higher latitudes? A number of factors from wind currents to cosmic dust might play a part, but most scientists now think that the variation in solar radiation is the critical factor.

Curiously enough, ice ages are associated with greater solar radiation. As temperatures rise, more water is evaporated from the earth's surface and there is more cloudiness and precipitation.

The following technical description of the vessel was issued by the Admiralty during March:

"H. M. S. Explorer has two shafts normally driven by conventional submarine motors but to each a turbine, deriving power from diesel fuel burnt in decomposed H.T.P., may be clutched to provide high speeds underwater."

"Each turbine installation operates on a 'direct cycle,' so called because heat transfer takes place between hot gas and water which passes a mixture of steam and carbon dioxide to the turbine."

"The major items of the turbine plant are: triple pump, propeller, control device, control valve."

"The condenser design is such that the steam is condensed and the carbon dioxide separated, the former being returned to a feed.
tank and the gas discharged overboard by a Lysholm compressor.

"The three working fluids: H.T.P., special diesel fuel and water, which feed the combustion chamber. The pump is driven by a 150 h.p. motor.

"Coupled to the motor shaft is a gearwheel which engages around the propeller shaft. The propeller is driven by a Lysholm compressor, which is connected by branch to the steam inlet by a clutch which is engaged by a switch operating a handle. This also admits primary oil to the igniter sprays."

"The gases leaving the combustion chamber are then available for admission to the turbine by operating the changeover valve."

"An impulse cycle was chosen for the turbine because of the large clearances necessary in order to meet the operational requirement for quick starting. At admission the turbine has a velocity compounded impulse stage, followed by five pressure compounded stages."

"The high pressure nozzle box is separate from the turbine casing and is formed into an admission ring supported at three points, and connected by branch to the steam inlet by a clutch which is engaged by a switch operating a handle. The nozzle box is adapted to allow for the quick starting requirement. A horizontal joint has to be made due to uneven heating of a bolted flange casing."

"The gases leaving the combustion chamber contain 14 per cent. by weight of CO2, the remainder being steam.

"A satisfactory carbon ring seal has been developed which prevents steam and carbon dioxide reaching the turbine shaft. Steam and carbon dioxide pass through a low pressure condenser."

"The turbine drives on to the main propeller shaft through double reduction gears and is connected, while the propeller shaft is rotating, by a clutch which is engaged when the turbine has been run up to synchronous speed with the propeller shaft."

"A Lysholm compressor was chosen for the discharge of exhaust gases overboard because it gives the best characteristics over the range of speed and throughput required. The rotors and rotor casings are uncooled. The compression is driven from the exhaust end of the turbine through the compressor gearbox."

"In any of its three positions the three cam valve will trip when any one of the following conditions occurs: (1) turbine overspeeding lubricating oil pressure falls; (2) maximum depth is exceeded; (3) maximum depth is exceeded."

"In the familiar internal-combustion engine, compression of air or air-plus-patrol-vapour is necessary before the fuel can be burnt. When the burning takes place, there is an expansion of the gas and mechanical energy is produced. This cycle of expansion and compression takes place in both piston engines and gas turbines."
bine which drives something or other; perhaps a ship’s propeller, perhaps the wheels of a car.

Just a quick “re-cap,” because the ideas may be a little difficult to understand at first. The “bouse” cylinders, one at each end, blow the pistons together to compress the air and make it hot enough to fire the oil fuel at the right time. In doing so, they produce some hot compressed air, ready to clean out the cylinders and pass on to the gas turbine. When the engine fires, the pistons fly apart and gradually stop by the bouse cylinders, but not before they have uncovered the scavange and exhaust ports that are cut into the cylinder walls. On this working stroke, too, the compressor cylinders have automatically taken in their fresh supply of air.

**Synchronising Gear**

Free pistons? Not quite. There has to be a mechanical arrangement linking the two pistons to make sure that they do move outwards and inwards in exact correspondence. This is called the synchronising gear, and compared with a heavy connecting rod, it is quite a light affair.

Probably you have been asking yourself, what’s the point of all this complication? Why not one engine or the other, a complete diesel or a complete gas turbine?

These are fair questions, and in many fields, particularly aircraft propulsion, the free-piston gas turbine will have very little interest for designers. But the combination has some advantages, particularly for power generation and ship’s propulsion, where it is already doing quite successfully.

Firstly, there’s the matter of efficiency. You probably know that internal combustion engines improve in efficiency as the compression is raised. That is why oil engines have the highest efficiencies, petrol engines a lower efficiency, and gas turbines a lower efficiency still.

And yet the gas turbine is an enormously powerful engine for its weight. It also has a useful characteristic in that it is more effective than a piston engine in turning a motor-car, the gas turbine would give better acceleration, and would need only a two-speed gearbox.

So the free-piston engine is an attempt to gain the best of both worlds: the high efficiency of the diesel engine with the good power-to-weight and other virtues of the gas turbine.

Tests have shown that the free-piston engine is only slightly lower than that of an orthodox diesel engine, but its power-to-weight ratio, while being better than the diesel, is not so good as that of the complete gas turbine.

I haven’t mentioned any disadvantages so far. There are, in fact, some difficult technical problems to solve, one of them being the difficulty of providing a large speed variation between full revs and idling.

The actual speed variation is brought about by changing the amount of fuel injected every stroke, and the greater the feed the longer the stroke. And yet if too little is injected, the pistons will not separate sufficiently to uncover the exhaust ports, in which case the case engine will simply stop.

As a matter of fact, the disadvantages are generally worse when the free-piston engine is applied to road transport, where the speed of the vehicle is constantly changing and the vehicle is frequently stopped and started.

My own view is that there will be many years of development of the engine for power-generation and ship propulsion before it will become a competitor of the ordinary motor car engine. After all sixty years of development have gone into the present-day engine.

Nevertheless, it is good to see the big motor-car companies spending large sums of money on new ideas, much as that may “come good” after a sufficient period of research and development.

**THE NAVY**

**OIL SEARCHERS DRILL 51,000 MILES**

In the entire history of oil search in Australia, only about 375 bores have been drilled. At present only seven exploration sites are being worked in the mainland and New Guinea.

By the end of this year, it seems probable that there will be more than 600,000 producing wells in the world.

Although a total for 1956 has not yet been released, the 1955 figure was 580,356, of which 537,682 were in the U.S.A. Canada had 8,759, South America 19,951, Middle East 625, Africa 296, Western Europe 4,737, and Far East 6,748.

**THE "STAND-OFF" BOMB**

Britain’s “V” bombers are to be equipped with a new type of guided weapon—an air-to-ground nuclear and thermo-nuclear missile described as a “stand off” bomb.

A SPOKESMAN for A. V. Roe and Co. Ltd. announced this in Sydney.

The company has been associated with the development of the missile.

"The 'stand-off' bomb will be fitted to the Vulcan and Victor bombers," the spokesman said.

"It is the size of a small fighter and can be released a long way from the target.

"After release, the missile will climb away from the bomber at a high speed and will fly at a great height to the target area, from where it will go into a steep dive to deliver its atomic warhead.

"It will be able to carry either atomic or hydrogen warheads."

A British Air Ministry statement also released in Sydney said that the two “V” bombers would be progressively developed and improved types would be introduced to carry the guided “stand off” bomb.

Armstrong Whitworth Aircraft Ltd.’s ship-to-air missile has been officially named the “Seaslug.”

Four of Britain’s constant-fleet escorts will be the first to be armed with the “Seaslug” for operations with the Royal Navy.

**TRAiNS RAN OVER OLD BOMBS**

For the past twelve years, trains on the Italian side of the Brenner Pass have been running over several hundredweight of high explosive.

Six large American bombs have been discovered on the railway line near Alba, midway between Verona and Trento.

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A SPOKESMAN for A. V. Roe and Co. Ltd. announced this in Sydney.

The company has been associated with the development of the missile.

"The 'stand-off' bomb will be fitted to the Vulcan and Victor bombers," the spokesman said.

"It is the size of a small fighter and can be released a long way from the target.

"After release, the missile will climb away from the bomber at a high speed and will fly at a great height to the target area, from where it will go into a steep dive to deliver its atomic warhead.

"It will be able to carry either atomic or hydrogen warheads."

A British Air Ministry statement also released in Sydney said that the two “V” bombers would be progressively developed and improved types would be introduced to carry the guided “stand off” bomb.

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NEWS OF THE WORLD'S NAVIES

Attack more likely from sea than air

Attack on the United States from the sea is probably more likely than attack from the air, the Chief of U.S. Naval Operations, Admiral Arleigh Burke, said recently.

The danger, he said, was submarine war. “We have to be able to identify enemy submarines at long ranges and kill them at long ranges,” Admiral Burke said.

Most of the ships the U.S. Navy has or is developing are designed to play some part in anti-submarine warfare.”

Washington reports state that Navy chiefs see the development of enemy submarines as platforms for long-range missiles as the main danger.

A submarine may surface hundreds of miles off the coast and bombard the mainland. The Russians are stated to have A submarine may surfac hundreds of miles off the coast and bomb the mainland. The Russians are stated to have had a submarine which was able to stay submerged for a long period, as there will be no need to recharge batteries every twenty-four hours as in conventional submarines.

The Royal Navy's first atom-powered submarine will be named the Dreadnought.

R.M. "frogman" believed prisoner in Russia

Newspaper reports in London last month stated that the British Government believed that Commander Lionel Crabb was a prisoner in Russia.

Commander Crabb, a prominent "frogman" of the Royal Navy, disappeared in Portsmouth Harbour on April 19 last year after diving near the visiting Russian cruiser Orshodzminikide.

Reports quote a senior British Government official as saying: “We are satisfied that Commander Crabb did not die when he went into the water near the Russian warships.”

The announcement said the company was developing a propulsion unit based on a pressurised water reactor—a similar type to that installed in the U.S. atomic-powered submarine Nautilus.

Rolls-Royce Ltd. are responsible for the design of the reactor and associated equipment, Foster Wheeler Limited the steam generators and associated equipment, and Vickers-Armstrongs Limited the turbines, condensers and other auxiliaries.

The announcement added: “The prototype machinery will be installed in a land-based hull structure. There the machinery will be proved, and a series of tests and trials carried out. It will also be used for training personnel.

“The machinery is designed to give a submarine high speed with very great range and will enable it to stay submerged for long periods, as there will be no need to recharge batteries every twenty-four hours as in conventional submarines.

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K.C.B., D.S.O. and Bar; Parliamentary and Financial Secretary, Mr. Christopher Soames, M.P.; Civil Lord, Mr. T. G. D. Galbraith, M.P.; Permanent Secretary, Sir John Lang, G.C.B.

Nuclear weapons for Royal Navy

Britain's Navy of the future is likely to consist of aircraft carriers with nuclear weapons.

Mr. C. Soames, Parliamentary Secretary to the Admiralty, said this in the House of Commons last month.

He said each task force would have a carrier, with a cruiser, destroyers, and frigates to give protection.

These forces would be stationed around the world, but would also be able to concentrate quickly at any given point.

He asked the Commons for £316 million to cover the cost of the Navy until April next year.

Mr. Soames said Russia had the biggest submarine fleet in the world and so far, and the construction programme was still in full swing.

He believed that by 1960 Russia would be able to deploy continuously about 150 submarines in the Atlantic alone.

In consequence of the merger, the Board of Admiralty in the future will comprise: First Sea Lord, Earl of Selkirk, O.B.; First Sea Lord and Chief of Naval Staff, Admiral of the Fleet Earl Mountbatten of Burma, K.G., etc.; Second Sea Lord and Chief of Naval Personnel, Admiral Sir Charles Lame, K.C.B., C.V.O.; Third Sea Lord and Controller of the Navy, Vice Admiral Sir Peter Reid, K.C.B., C.V.O.; fourth Sea Lord and Chief of Supplies and Transport, Rear Admiral R. D. Watson, C.B., C.B.E.; Deputy Chief of Naval Staff and Fifth Sea Lord, Vice Admiral A. N. C. Bingley, C.B., O.B.E.

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Britain's status and the H-bomb

Newspaper correspondents in America last month claimed that Britain's H-bomb had restored her status as a leading world power. Britain exploded her H-bomb over Christmas Island on May 15.

All Japanese vessels operating near the danger zone have been reported safe.

Britain's Prime Minister, Mr. Harold Macmillan, on May 16 curtly rejected a Labour M.P.'s demand to halt the H-bomb test programme.

Utility helicopter for U.S. Navy

Kaman Aircraft Corporation, Bloomfield, Connecticut, U.S.A., has received a research and development contract for a new utility helicopter, the U.S. Navy has announced.

The contract is a result of Kaman's winning entry in a Navy design competition in which leading companies in the helicopter industry participated.

Kaman entered both twin-rotor and single-rotor designs in the competition. The Navy chose the single-rotor design, which will be known as the HU2K-1.

It will be powered by a General Electric T-58 gas turbine engine.

Food tastes better... with Good Beer

Keep a Good Lookout for the next issue of The Navy

P.O. Box 12345, 5678 Street, City, State
AMERICAN SHIPS HERE FOR CORAL SEA WEEK

The Commander-in-Chief of the U.S. Pacific Fleet, Admiral Felix H. Stump, said in Sydney during the Coral Sea Week last month that he would like to see the Australian armed forces as strong as we are all," he said.

Admiral Stump, the official U.S. visitor for the Coral Sea Week celebrations, was speaking at a luncheon at the Trocadero.

Admiral Stump said: "There is a necessity for ANZUS apart from SEATO. We have many things we need to discuss and plan together which do not concern Asia."

Referring to the Suez crisis, he said: "There was a serious difference of opinion between our Government and the Government of the United Kingdom.

"The British officers and the United States officers had no differences. They continued to trust each other despite political differences."

"In the event of war, whether we like it or not, we are going to be on the same side and we are going to like being on the same side."

"History only will tell what was the best thing to do in Suez."

"At present we are stronger in the free world than is Russia. If we keep stronger we continue to have peace."

Earlier, Admiral Stump laid a wreath on the Cenotaph in a ceremony watched by 3,000 people.

"We must dedicate ourselves to making the sacrifice necessary to keep Australia and other nations of the British Commonwealth and the United States so strong no enemy will ever dare to attack us again," he said.

At a civic reception, the Lord Mayor, Alderman H. F. Jensen, congratulated Admiral Stump on the good conduct of the visiting American sailors.

The U.S. aircraft carrier Bennington, which was in Sydney for Coral Sea Week, left with a paper-mache alligator, sent by students from Sydney University. About 4,000 people gave the Bennington a noisy send-off.

The alligator was said to be a peace-offering. Early in the morning of the carrier's departure students, celebrating Remembrance Day, boarded the ship and sounded the chemical warfare alarm.

Garden Island officials said it received the best send-off of any overseas warship since World War II.

As the Bennington left the wharf, a call went over its loudspeakers: "Three cheers for Sydney."

The crew cheered, and threw hundreds of sailors' caps to friends on the wharf.

One sailor nearly missed the ship. The Bennington was 300 yards out from the wharf when a Water Police launch brought him alongside and he climbed aboard.

Before the Bennington sailed, Admiral Lee said the friendliness and hospitality of the Australians could not be equalled anywhere in the world.

"Particularly for the officers and..." Continued on page 32
BATTLE AGAINST THE SEA
BY ALLAN OLIVER

Perhaps only a Dutchman can sense how bitter an enemy water can be. The full realization was brought home to me one Sunday morning in February, 1953, when I stood amid a group of the men and women who were to lose another home to the sea. The North Sea—perhaps only a Dutchman knew how close the high gales had swept the North Sea overnight through 67 gaps in the dikes and dunes of southwest Holland.

In a few hours the roaring giant had brought death and destruction. The sea water from the west and the swollen rivers from the north and east had drowned nearly 2,000 people, 40,000 cattle, damaged 30,000 houses and completely washed away another 10,000. Over 300 miles of dikes were torn open, and nearly 600 square miles of Holland's best farmland flooded with damaging salt water.

It was a bitter enemy in the centuries-old war between Dutchmen and water. There's not a nation in the world can sense how bitter an enemy water can be. This was part of the sea's latest dramatic move in the centuries-old war between Dutchmen and water.

From every part of Holland, from all over the world, volunteers came to the rescue, and hands reached out to help. In those tragic days, once more renewed, a brave people's grim determination reached a climax. "Never more!" they said before this time few words were said. And even fewer minutes wasted. Exactly nine months and five days after the disaster, late in the afternoon of November 6, the last of the 67 gaps was closed.

The following day a new battle began. Holland now faced an offensive designed to bring the enemy to total defeat.

There's no nation in the world so closely linked with the water, so lastingly married to her worst antagonist. The Netherlands, or Low Countries, as Holland is often called, are to a large extent a real and constant part of the sea. During the past three centuries more than half the present Dutch territory has been reclaimed from the North Sea.

This land lies between 3 and 30 feet below normal water level, behind a 12,000-mile-long system of dikes and dunes.

The territory also is crossed by a number of large rivers: the Scheldt, the Maas, the Rhine, and the IJssel. The total surface of Holland's inland water amounts to some 13,000 square miles, or 10 per cent of the entire territory.

Water became the Dutchman's natural enemy when, as far back as the 13th century, people in the province of Friesland built dikes to keep a constant hold over some large lagoons that during the dry summer season was abandoned by the sea.

In the Golden Age, prosperous Amsterdam merchants invested their money in schemes to make polders—farmland—by draining inland lakes and marshes.

Some of these lakes were large enough to have the violent character of a sea. Most of them covered fertile land. The future polders were surrounded by dikes, and windmills were built to pump water out into canals and rivers.

The example of their forefathers inspired the Dutch early in this century to a plan which astonished the world. The plan was to reclaim the whole Zuiderzee, an arm of the North Sea reaching 85 miles deep into Holland. First the Zuiderzee was to be cut off by a 24-mile dike. Most of the lake thus created was then to be drained to get yet more first-class farmland.

The project caused a cabinet crisis, a rare event in Holland's political history. More than half the population considered the idea to be too ridiculous for further serious thought. But the promoters of the plan did not give up. The sea furnished them with a fresh argument when in 1916 floods opened the breach of the great Zuiderzee barrier to disaster to a dozen of the small villages on the Zuiderzee coast. In 1918 Parliament approved the plan.

In 1932 the cut-off dike was finished, and the people along the Zuiderzee's 200 miles of coastline no longer had to fear the enemy. But instead of being pleased about this victory, they raised the most ardent opposition against the plan.

They had come to realize that their main industry, sea fishing, would slowly come to an end as the salt water was sweetened by the river water running into the now-enclosed lake.

In the Golden Age, prosperous Amsterdam merchants invested their money in schemes to make polders—farmland—by draining inland lakes and marshes.

Eventually, the old-fashioned windmill system was inadequate. Two electric pumping plants were built. They did the job in the Wiehingermeer completely in less than six years, and a few months earlier they had first made use of this demoralizing weapon when they had flooded the islands of Walcheren.

Wiehingermeer offered a hopeless sight. Not one house or barn was left undamaged, the growing crops were destroyed, and there were no means available to start repairs. But during the summer of 1945 the two giant pumping plants were re-equipped with stronger turbines, and before winter came the polder was dry again. Since the water had not contained a large percentage of salt. Wiehingermeer produced a modest harvest even in 1946. As the North-east Polder was opened up, work began on the third polder, East Flevoland (325 square miles). East Flevoland was completed late last summer. This year the first houses, schools and churches were built there, on the former sea bottom.

Two polders remain to be constructed: Markerwaard (325 square miles), and South Flevoland (300 square miles). They may well be ready before the deadline, the summer of 1980.

There's a willpower and a determination to put a new Holland on the map that is stronger than even the spirit of enterprise shown in the nation's Golden Age.

That isn't all. It's ironic that it took the lesson of the 1932 floods to gain acceptance for an even larger project that had existed really, since long before the war. This scheme is nothing less than to build dike almost entirely around the group of islands lying off the southwest coast of Holland.

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For years, Dutch experts had been studying a plan to strengthen the defence against the North Sea by closing three sea-arms in the island district. But up to the 1953 disaster, the idea that an entire province of Holland stood in grave danger would have been dismissed as complete rubbish by most people.

Not for a century and a half had there been any serious flooding in the region—from natural causes, that is.

Then in 1953 there came a combination of natural circumstances which occurs perhaps once in 200 years.

The resulting disaster brought proof that half the country, and the lives and livelihood of half its population, depended on sea defences that were inadequate.

The lesson was taken to heart, and the so-called Delta Plan—then expected to cost in the neighborhood of $300 million—was adopted.

The plan provides for building three main dikes right across the three large channels, strengthening existing dikes and dunes, and constructing a further series of pumping plants and lock systems throughout the province of Zeeland.

Careful preparations for putting the Delta Plan into effect are now under way, and already the original cost estimate has been doubled. There is no telling how this project will be finished around 1985, and with its completion Holland expects her most implacable enemy to go down in final defeat.

The triumph of man over nature will no doubt be announced with that old Dutch cry of victory: "De dijk is dicht!"—the dike is closed!

—from the "World Veteran"

JAMES McKEOWN, SONS PTY. LTD.
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June, 1957.
AIR STRATEGY

Planning For Two Kinds of War

By JOHN W. R. TAYLOR—London

WORLD War II was fought for the most part with weapons that were under development before it started. In the air, the Hurricane, Spitfire and 109 fighters met in the Battle of Britain and the great Lancaster, Halifax and Fortress bombers with which the Allied air forces hammer Germany in the later round-the-clock counter-offensive were all conceived in the mid-1930's.

Even the Superfortress, which laid waste so much of Japan in 1944-45, began life in 1940, long before America entered the war. There were two important exceptions—the jet aircraft and the atomic bomb—and their sudden brief intervention as the fighting reached its climax changed overnight the whole pattern of aircraft design and overall military strategy.

At first, ideas were confused by the quick ending of the Pacific war, the wholesale cancelling of production contracts, the belief that many years of peace lay ahead, and a realisation of the awful, overwhelming power of the new bomb that could burn the heart out of a city in one searing flash.

More confusion was added when Allied technical teams examined captured enemy documents that revealed the full extent of German research and progress with piloted aeroplane and missile projects. In many cases, these projects were in an early stage of development, but they were pointers to the future.

FIRST, however, it was necessary to build up strong defences, for the fear of sudden attack was genuine on both sides of the Iron Curtain. And here designers of every country had a common enemy, which the newspapers called the "sound barrier.'

To technicians it was "comparability"; to pilots a vicious shock-wave that formed when the aircraft approached the speed of sound (760 m.p.h. at sea level, dropping to 660 m.p.h. in the rarified air above 36,000 ft.) and which caused buffeting so severe that it led to loss of control and sometimes break-up of the aircraft in flight.

Costly research programmes were started in all the major aircraft producing countries to find a way of getting interceptor fighters past the sound barrier.

Yet the discerning reader would not have it shorter, for it is packed with facts, all of them vital for an understanding of the Navy's work in a world-wide war. Captain Roskll mar- shals these facts with the deft touch of a true historian and from them paints the picture of naval operations during the pregnant years covered in this second volume.

His description of the disaster of his intricate subject with which the reader is switched from campaign to campaign in an arbitrary limit of dates, so that some of the natural sequence is lost.

As a direct result of this, some of the overall picture is lost. This is not Captain Roskll's fault, it is the fault of the rigid framework of the book in which so much is contained in so much detail.

Captive Roskll's plan of writing is completely logical for the particular task he has set himself. Indeed, he could have achieved it in no other way.

For the naval reader, already aware of the profound effect which sea power exercises on the conduct of the war, this new volume makes wonderful reading.

Captain Roskll is a fearless writer, as should any true historian be. He has seen all the facts of his story, and he has the balance of his own judgment, and passes sentence without fear or favour.

In the second volume of Captain Roskll's monumental history of the Navy during the Second World War has now made its way to the reading public. It consists of 444 pages of text, 15 appendices, 42 maps and 38 tables, a formidable mass of information to be absorbed within the covers of a single volume.

His description of the disaster in the Barents Sea when convoy PQ.17 lost so many of its ships is a case in point. There is no attempt here to gloss over the facts which were made on that unhappy occasion, and he appor- tioned the blame with obvious impartiality. And yet one tiny facet of the grim picture is missing.

The decision to scatter the convoy, for which the First Sea Lord was responsible, was taken by a man who was already very sick and in considerable pain. The constant battle which, even at this date, Admiral Pound was waging against the disease which eventually laid him low may well have clouded his judgment on that occasion. Such a thing has happened many times before in the history of the Navy.

This fine book, by any standard a brilliant piece of work, whets the appetite for Volume III, which will bring the story to a close. In this first volume, Captain Roskll made a fine start to a work that promises to stand out as a monument in the writing of naval history.

This second volume consolidates that promise in the mastery of his intricate subject with which Captain Roskll writes—N.O. (in the London "Navy.")
A properly designed aircraft. The Berlin air lift of 1948-49 showed that the uneasy peace might be better maintained at times by fleets of transport aircraft and bombers. But it was the Korean Campaign, starting in 1950, that gave conclusive proof of the necessity of planning for two kinds of war. Nobody stood to gain much from an all-out slogging match with nuclear weapons. A small-scale "local" war of the old-fashioned kind was a different matter. History had shown over and over again that a comparatively small, determined army, fighting guerilla-fashion in conditions and country of its own choosing, could play havoc with even the best-equipped enemy fighting in unfamiliar circumstances that denied the full use of his weapons.

So it was in Korea and later in Indo-China. And so it will be again if preparations are not made to meet the threat of local wars as well as the full-scale variety.

Korea persuaded the R.A.F. to order large-scale production of its first genuine swept-wing dive-superior fighters, the Supermarine Swift and Hawker Hunter, and it accelerated the development of newer, faster fighters in America, Russia, France and Sweden; but designs began once more to diverge after a period in which they seemed to follow the same straightforward swept-wing fashion.

In the physical sense, the biggest impact had come probably from the advent of the delta-wing, discovered that the characteristics of swept wing could be improved by giving it compound sweep (the familiar "saw-tooth" effect). Simultaneously, other companies were trying to set up a force of rockets, with the result that the now-familiar "supersonic boom" was heard for the first time when it shed its shock-waves at the bottom of a dive and they continued down to produce a thunder-clap at ground level.

In Britain, Hawker and Supermarine produced new jet-fighters, both straight and swept-wing; but the Air Ministry, gambling on peace, decided that its Meteor, Vampire and later Venoms would be good enough for a few years until even more advanced aircraft were possible. Up to that time fighter forces had been so mesmerised by the atomic bomb that they planned for little but an all-out nuclear war, which it was reckoned would last about a fortnight, after which the least-atomised nation might be regarded as the victor.

Japanese pearlers to operate off N. Aust.

Japanese pearlers will operate off the northern coast of Australia during the forthcoming 1957 season under an arrangement made by the Commonwealth Government, the Australian Minister for Primary Industry, Mr. W. McMahon, has announced.

But to conserve shell resources limits are being placed on their activities in certain areas. Mr. McMahon said that the Japanese pearlers would operate again this year under the Provisional Regime set up by the Governments of Australia and Japan.

It was a temporary arrangement concluded in 1954 to operate pending a decision by the International Court of Justice on Japan's challenge to the validity in International Law of the Australian Pearl Fisheries Act 1952-53.

"Arrangements for the 1957 season are substantially similar to those which operated in 1956," Mr. McMahon said. "The number of pearling vessels approved is the same and the greater part of the Japanese operations will again take place off the Northern Territory."

"However, in the interests of conserving shell resources in two areas are being closed to shell pearling and an upper limit is being placed on the quantities of shell the Japanese will be permitted to take in two other areas north of Arnhem Land," he said. Permission was again being given to the Japanese to operate in two areas of the north-west coast of Western Australia, and they would also be permitted to take a limited quantity of shell from an area south-west of Broome.

The areas to the west of Torres Strait, which were made available last year, would be slightly enlarged this year. The prohibition against the Japanese operating within 10 miles of the Australian mainland or of an inhabited island would continue to apply. But arrangements would have to comply with all requirements of Australian legislation, including the taking out of licences and furnishing of returns. Their activities would be closely supervised.

Whaling in the Pacific

Japanese whale marking started in 1949 and has since then continued annually. Whaling has been carried out in coastal and pelagic whaling areas.

Japanese whale marking started in 1949 and has since then continued annually. Whaling has been carried out in coastal and pelagic whaling areas. Whale marks used at present are made of chromium plated steel tubes 220 m.m. long, weighing about 100 gr. Besides the usual penicillin oiled marks, streamer marks with coloured nylon threads are also used.

On twelve marking cruises 1949 to 1955 a total of 2,551 whales were marked in the North Pacific of which only 37 were recaptured.

The percentage of recapture was low.

A twenty-five marked whales were taken in the year they were marked, 15 within 10 days, and 10 within 100 days of marking.

One whale (a female sperm whale) was killed 2,165 days after marking. It is estimated that the whale grew from 22 ft. to 36 ft. between August 4 1949 and July 8 1955.

Generally the analysis suggests that growth in sperm whales is slow.
result has been achieved under the leadership and direction of both the United Nations and the United States, which adopted a completely one-sided approach to the Suez crisis and reneged on their own principles and pledges.

The British Prime Minister, Mr. McMillan, announced in the House of Commons on May 13 that British ships would go through the Canal.

He said the Government had agreed to this because of the decision of a majority of members of the Suez Canal Users' Association.

This decision was to let Governments make their own choice on the unofficial boycott of the Canal.

Pipe-line proposed by by-pass Suez

Executives of eight international oil companies met in London last month to discuss a new £300 million sterling oil pipeline for the Middle East.

The pipeline would carry oil from the Persian Gulf oilfields through pro-Western Iraq and Turkey to the Mediterranean.

It would also carry enough oil to keep West European countries going if the Suez Canal was again closed.

But the companies are also considering that Western countries' demand for crude oil will increase by 70 million tons a year in the next five or six years.

Planners have suggested that for this amount of extra oil a new trunk pipe line system with a capacity equivalent to a double 38-40 inch line should be built in stages.

They estimate it would take from three to five years to build.

14 new ships for Australian line

The Australian National Shipping Line has announced a building programme which will add 14 ships to the line's fleet by 1961.

Most of the ships will be built at the B.H.P. shipyards at Whyalla (South Australia).

The line now has 48 ships on the register.

A spokesman for the line said additional tonnage was needed to meet increasing coal and iron ore traffic.

The programme includes ten bulk ore carriers, mainly of 10,000 tons, and four ships of 16,000 tons each.

The line also announced that a new £2 million passenger-vehicle ferry for Bass Strait would be built at Newcastle (N.S.W.).

A FAMOUS SHIP NAME

Special Correspondent

THE name Dreadnought, earmarked for the Royal Navy's first nuclear submarine (see page 3(7)), was made famous by the battleship of this name built at Portsmouth in 1906.

This ship was of 17,900 tons and of a design which revolutionised battleship construction at that time. She was superior in both firepower and speed to any other ship then afloat, and was described by Lord Fisher as the "hard-boiled egg" — because she cannot be broken.

Her main armament consisted of ten 12-in. guns, eight of which could be fired on either beam and six ahead and astern.

The armament of battleships immediately before the completion of the Dreadnought was normally of about four 12-in. guns supported by a miscellaneous battery of nine, eight, six and four-inch guns.

Many ships of Dreadnought design subsequently built materially helped to maintain and strengthen Britain's position as the premier naval power in the pre-World War I period.

Before the Dreadnought of 1906, seven other ships had borne this name. The first, a 450-ton 41-in. gun ship built at Deptford in 1887, was one of the British fleet which engaged the Spanish Armada. Subsequently she took part in the expedition commanded by Sir Francis Drake which resulted in the capture of Corunna.

The second Dreadnought was a first-class frigate built at Blackwall in 1853. She took part in the four days' fight against the Dutch between Dunkirk and the Downs, and also in the battle of Solebay. The 6th Dreadnought was a present at the battle of Trafalgar and later became a Seamen's Hospital at Greenwich.

The Navy

June, 1957.

CRUISERS FOR ROYAL NAVY

By OSCAR PARKES, Ass.I.N.A.

JUST over 10 years ago work ceased on three out of a group of six cruisers of a modified "Fiji" design which had been laid down in 1941-42. Of these six the Swiftsure, Superb and Ontario (ex-Minotaur) R.C.N. were in commission when hostilities ceased, but the Blake, Defence and Tiger, although in an advanced state of fit, were suspended and laid up pending some decision as to their employment. Two more, the Hauke laid down at Portsmouth and the Bellerophon (ex-Tiger) ordered from Vickers were cancelled, and the framing of the Hauke was broken up on the stocks.

Incidentally, there was some confusion in the allotment of names, as the Blake was also ex-Tiger and the Tiger had originally been named Bellerophon. One concludes that the naming committee at the Admiralty recalling that both the early destroyer Tiger and the battlecruiser of that name, had been built by John Brown & Co., consequently changed the name from Bellerophon to continue the Clydebank sequence.

And so the Blake, laid up at Greenock. Tiger at Dalmuir and Defence at Gareloch, were kept in maintenance awaiting decision as to future employment until October 1954, when the news was released that they were to be armed with four of a new type of fully automatic dual-purpose 6-in. and 13-in. guns.

As suitors to the Swiftsure their particulars will be familiar—8,000 tons designed displacement, 75,000 s.h.p. for 31 knots, and intended for nine 6-in., 10 4-in. A.A., 16 2-in. pompons and 13 40-mm. with six torpedo tubes. As re-
YOUTHFUL MUSICIANS

By DOROTHY HELMICH

President of the N.S.W. Division of the Arts Council of Australia

A NATIONAL Youth Orchestra has been formed and recently gave its first concert in the Sydney Town Hall under the auspices of the A.B.C.

The conductor was Professor John Bishop of Adelaide, who is also the founder.

This orchestra is made up of instrumentalists between 25 years of age.

The performance was excellent.

Another musical activity is the Music Camp Association held in June, 1951, Lieut.-Commander John Bathurst, captain of H.M.S. Reclain, was sitting in his cabin intently watching a television screen. Then suddenly on the viewing screen appeared the name Affray—and a new chapter in the story of nautical development had been opened up.

For the first time television had shown what an important role it will play in the future of shipping.

After eight solid weeks of search to solve the mysterious disappearance of the submarine Affray, underwater television had at last located her lying at the bottom of the English Channel by means of a newly-discovered camera suspended 260 feet below H.M.S. Reclain.

Without the magic, all-revealing eye of television this submarine might never have been discovered, and the sea would have kept the secret of the most baffling naval disaster since the war.

Since the location of the Affray great improvements have been made to underwater television. Already it is capable of being used at depths in excess of one thousand feet, and naval authorities predict that in the near future it will be able to descend to almost any depth.

Moreover, whereas the camera in the Reclain was enclosed in a cumbersome container weighing over a ton, the models installed on the Royal Research Ship Discovery II, the salvage vessel Sea Salvator and the frigate H.M.S. Wrangler are only about seven hundredweight and consequently much more manoeuvrable.

The latest underwater camera is rectangular in shape and closely resembles a B.B.C. studio camera, but because it has to operate in very poor light, it is fitted with an ultra-sensitive image orthicon tube which can see in almost pitch darkness. To assist further it has a powerful mercury vapour lamp, providing illuminative power equal to about two hundred ordinary electric bulbs.

To withstand the terrific underwater pressure—there is a pressure of approximately 1,200 pounds per square inch at a depth of 1,000 feet—the camera is housed inside a casing made of three-quarter-inch thick steel plate, with an eight-inch diameter window of armoured, highly-tempered glass.

The camera is connected to the control panel by a multi-core cable, containing a number of leads which enables the operator on board a ship to carry out manoeuvres by remote control.

The use of this modern marvel are limitless. For instance, television has recently been adapted for use in fishing vessels and one underwater television has been installed in the Red Rose, a new 600-ton Fleetwood vessel. Now the trawler with a television screen can actually stalk its prey.

Moreover, whereas the camera in the Reclain was enclosed in a cumbersome container weighing over a ton, the models installed on the Royal Research Ship Discovery II, the salvage vessel Sea Salvator and the frigate H.M.S. Wrangler are only about seven hundredweight and consequently much more manoeuvrable.

The camera can save countless hours of work on the part of divers.

But there is no doubt that tele-

Television Under the Sea

By DERMIT CANNING

A FEW minutes after midday on June 4, 1951, Lieut.-Commander John Bathurst, captain of H.M.S. Reclain, was sitting in his cabin intently watching a television screen. Then suddenly on the viewing screen appeared the name Affray—and a new chapter in the story of nautical development had been opened up.

For the first time television had shown what an important role it will play in the future of shipping. After eight solid weeks of search to solve the mysterious disappearance of the submarine Affray, underwater television had at last located her lying at the bottom of the English Channel by means of a newly-discovered camera suspended 260 feet below H.M.S. Reclain.

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vision's primary contribution to the shipping world will be in salvage work. Indeed, many experts believe that it will completely revolutionize present deep-sea salvage operations, eventually making them an entirely mechanical operation.

A camera has located the wreck of a ship with a speed and accuracy previously unknown, mechanically-operated lifting gear will be brought in. Directed and remotely-controlled by an operator standing in front of a television screen on board the salvage ship, underwater cranes and grappling irons will raise bulk cargo to the surface.

Experiments are also being carried out on an electronically-controlled robot which could be lowered, and by remote control and through the eye of an underwater television camera, made to attach lines for a manned submarine at depths far beyond the reach of human divers.

As its range increases, underwater television may prove to be a new weapon of sea detection, and if there is a future war, television will play an important role as the viewing eye of remote controlled rockets, aeroplanes and other similar weapons which can be "shot" from abroad ships.

It will also bring new safety factors into submarine operation by giving eyes to the submarine itself when it is moving submerged, and television used in conjunction with infra-red transmission will enable ships to see moorings even through as much as ten-thousand feet. All these recent applications of television serve to show how it is fast becoming one of the shipping world's most useful employees.

It is a sort of super-eye that, equipped with powerful lamps, can be lowered far under the surface of the sea where it can observe the ocean floor, the plants and animals, and the wrecks of sunken ships.

No job seems too difficult for underwater television yet only a minute fraction of its vast potentialities have been explored. Its possibilities in the future are, indeed, without limit and the introduction of stereoscopic vision will certainly add to its versatility.

—From the "Sea Cadeo" (London)

BYNG'S EXECUTION IS REMEMBERED

Special Correspondent

DESCENDANTS of Admiral Byng have paid a wreath by his portrait at the National Maritime Museum on March 14 — the 200th anniversary of his execution.

Admiral Byng was shot on the quarter deck of H.M.S. Monarch on March 14, 1757, by sentence of a court martial which found him guilty of failing to exert himself to the utmost against the French off Cape Malea in the defence of Minorca.

Until his appointment to command a squadron with the special duty of relieving Minorca in 1756, Byng's naval career had not been particularly noteworthy.

The son of Lord Torrington, an Admiral of the fleet and former First Lord of the Admiralty, he had passed through the usual stages of promotion and reached the rank of Vice-Admiral after 29 years of service.

The failure to relieve Minorca, coming at a time when British forces were suffering setbacks in other theatres of war, was attributed by the Government to Byng's lack of determination and negligence.

Byng claimed he was the victim of political intrigue.

Pamphlets which both sides produced gave the issue a publicity which was increased by subsequent Parliamentary efforts to obtain the recommendation to mercy made by the Committee of the House.

Byng's death was legally justified by the disciplinary code of the day, but the catch phrases of the pamphlethes made it the cause for partnership and argument which it has remained until the present day.

PLANNING FOR TWO KINGS FOR THE WAR

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Aircraft like the Convair F-102 has only to fly over the course he receives over his radio until it is in the general vicinity of the target. Then he flies back while the infra-red receiver, which is located and "locks on" to the enemy, flies the F-102 to within range through the autopilot, works out the correct "angleoff" of the missile to the target and fires it at them; after which the pilot has only to take over for the return to base.

DRIFT could not rely on such aircraft. To start with, it is not able to throw a radar ring around its coast at a distance of several hundred miles to give early warning. Nor, because of its vulnerable geographic position, is it able to bear a no-less powerful nuclear submarine.

The Stratomars are now being joined by squadrons of eight-jet B-52 Stratofortresses, with true intercontinental range, and the capabilities of these huge bombers were shown when three of them encircled the world non-stop, with the help of flight refuelling tankers, in January, 1957.

America's B-52 bombers are big because they have to carry a great deal of fuel to give them sufficient range to reach Russia from bases in the United States. For a similar reason, Russia is building comparable aircraft — the giant four-jet bomber known in the west under the code-name of "Bison" and the no-less impressive turboprop "Bear." Presumably they also use flight refuelling, for otherwise the most important targets in the continental United States would be beyond their range.

Britain, on the other hand, has developed an entirely different class of nuclear bomber. With potential targets much nearer, great range is not essential, and the Vickers Valiant, Avro Vulcan and Handley Page Victor "V" bombers are therefore much smaller, and the Avro Vulcan being a no-less powerful nuclear warload.

A combination of small size, low wing loading and the high power of four great turboprops gives the later Vulcan and Victor in a speed so near to the speed of sound and at such a great height, that they would be virtually impossible to intercept at night with any fighter aircraft in service, and they need no defensive armament, which again saves weight and improves performance.

So much for the all-out nuclear war. How would these first-line aircraft of the great powers fare in a local war? The Suez action in November, 1956, gave an indication, because the R.A.F.'s Valiant, Canberra, and Hunters, had no difficulty in eliminating the opposing air force and other military objectives, although this involved operating from very small airfields hundreds of miles from bases without the use of their most powerful offensive weapon.

Other aspects of the operation were even more significant. For example, America's Hawk and de Havilland Sea Venom fighters and Westland Wyvern strike aircraft from carriers of the Royal Navy contributed a very great portion of the air component used at Suez.

This re-emphasises the lesson of Korea that there is a very real need for aircraft carriers to provide a close support for land forces in local wars, where there are few, if any, land bases available.

It can be argued that the carriers would have had a difficult task to do themselves against determined submarine and air attack in each campaign; but this ignores the proven ability of such ships to defend themselves.

In fact, only eight of the 48 carriers used by the Royal Navy in World War II were sunk, only one of them by aircraft, and there
has certainly never been a case of a carrier base being captured and used by the enemy!

For sea cadets

LITTLE SHIP’S EXCITING LIFE

BY JACK DUSTY — in London

One of the little ships that did so much to win the last war and in so doing crammd more excitement into her short life than falls to the lot of most was the “Master Standfast.” Her career included running the blockade to Sweden during the darkest days of the war, capture by the Germans after a brisk fight, and finally recapture by the Royal Navy on May 5, 1945.

IN 1941 various Swedish merchant ships, products, especially barrels and bearings, were urgently required to speed up the production of war material in England, and it was decided to build a fleet of special high-powered diesel-engined craft to follow the example of two Norwegian merchant ships which early in the year had successfully run the German blockade from Sweden with a valuable and urgently needed cargo.

To penetrate minefields these craft were of shallow draught, while their high speed gave them a reasonable chance of escape if detected.

Foe and allies permitted some 40 tons of cargo to be carried, and the crew of 18 included two wireless operators.

For defence the ships were armed with twin Oerlikon guns carried forward and aft, in addition to twin Vickers machine-guns on each side of the bridge and a quadruple machine-gun sbart the bridge.

The five ships—the Nansuch, Hopewell, Gay Viking, Gay Corsair and the Master Standfast—which formed the little fleet were all manned by Merchant Navy officers and men, and were operated by Mears, Ellerman and Wilson of Hull.

The crossings from Sweden to Hull took 36 hours and were confined to the winter months, moonless nights with heavy low cloud being preferred as these conditions reduced chances of detection to a minimum. Conditions of life on board were extremely bad, due to the bad weather which was frequently experienced and the uncomfortable motion of the ships owing to their high speed and steepness when laden with cargo.

It was under such conditions that the Master Standfast spent the first year of her life.

Detected

In the early hours of the morning, Nov, 24, in position 58° 33’ North, 10° 40’ East, the German patrol boat V.1605 of the 16th Patrol Vessel Flotilla was keeping listening watch, and at 0420 her directional hydrophones picked up the noise of engines. “Action Stations” was sounded, and the patrol boat proceeded at full speed in the direction indicated.

After 20 minutes nothing further could be heard on the hydrophones, and the German Captain assumed that whatever he had picked up had stopped. A close look-out was, therefore, kept, and at 0500 a darkened vessel was seen.

At first the German Captain believed that the shadow was his own, but the Master Standfast was being hit incessantly and soon stopped.

With her Captain, First and Second Mates and both Radio Officers wounded, and after being boarded by the larger and more heavily armed German, further resistance was useless and the Master Standfast surrendered — “after some hesitation” according to the German official report of the action. She was towed into Frederikshavn, where her gallant Master — Captain C. R. W. Holdsworth — died in the Naval Hospital.

The crew were interrogated by the German Naval authorities but gave nothing away, and made a great impression with their captors.

The German Naval Commander-in-Chief reported to the Operations Division of the Naval Staff that “...the crew made an excellent impression and had been selected very carefully: the proso-
Navy's Role in G.M. Age

Continued from page 7

Guard our vital interests overseas except by permission and on behalf of the United Nations. How then can we best make our influence felt in the councils of the world as a great military Power?

At the present time we are spending nearly £1,000,000 on each V-bomber and an equal amount on each hydrogen bomb. How much of them we intend to have for prestige purposes is anybody's guess. But such relatively small numbers as we can afford to produce will have no effect whatever on Soviet policy which is influenced solely by the massive United States Strategic Air Force and the large stockpile of thermo-nuclear missiles which it has available.

The ballistic rocket era now gives this country a new opportunity. We must build ships of 20,000 tons capable of carrying a worthwhile number of ballistic rockets with a range of up to 1,000 miles.

The vessels need not be larger, for rockets have no recoil. The Royal Navy will then become no less important than the United States Navy in its deterrent value and in the part it would play in a global war.

Some of these ships would also carry guns, others fighters and anti-submarine aircraft, depending on the types of vessels an enemy has available and the degree of support expected from the navies of the other NATO Powers.

They will be expensive, these ships and rockets, but no more expensive and of much greater value than the force of V-bombers and stockpile of thermo-nuclear bombs we are now producing to supplement an already adequate deterrent.

—From the London "Navy:"

Planning for Two Kinds of War

Continued from page 30

Speeded by the need for economy in military expenditure.

Other countries are being more cautious, because there is no certainty that the defence (both on the ground and in bombers) will not find a method of confusing the guidance systems of missiles so that they become mis-guided.

A missile is terribly complex, with a maze of equipment to go wrong, and it cannot reason.

If it finds itself heading for a friendly aircraft, it will not call off the chase. Some of the techniques on which it relies, such as infra-red "homing," lose their efficiency in cloud or bad weather. And there can never be a substitute for piloted close-support and transport aircraft in local wars.

Nor should we forget that new developments might give piloted aircraft the performance and invulnerability of a missile at lower cost and with a better guarantee of accuracy.

The French claim that their Leduc 0.22 fighter, powered by a ramjet engine of mighty power, may soon prove itself capable of 2,400 m.p.h. North American are designing a research aircraft to fly at 4,000 m.p.h. at 250,000 ft. and the research aircraft of today is the fighter or bomber of tomorrow.

Even more fantastic developments, resulting perhaps from current "anti-gravity" research, may change the whole picture overnight in favour of piloted aircraft. Following experiments by Avro Aircraft in Canada, we may even see genuine flying saucers giving technical sea training to and instilling naval training in boys who intend to serve in Naval or Merchant services and also to those sea-minded boys who do not intend to follow a sea career, cut who, given this knowledge, will form a valuable Reserve for the Naval Service.

The object of the Navy League in Australia, like its older counterpart, the Navy League in Britain, is to insist by all means at its disposal upon the vital importance of Sea Power to the British Commonwealth of Nations. The League sponsors the Australian Sea Cadet Corps by giving technical sea training to and instilling naval training in boys who intend to serve in Naval or Merchant services and also to those sea-minded boys who do not intend to follow a sea career, cut who, given this knowledge, will form a valuable Reserve for the Naval Service.

The League consists of Fellows (Annual or Life) and Associates.

All British subjects who signify approval to the objects of the League are eligible.

May we ask you to join and swell our members so that the Navy League in Australia may be widely known and exercise an important influence in the life of the Australian Nation?

For particulars contact The Secretary, 83 Pitt Street, Sydney, N.S.W.

or The Secretary, 443 Little Collins Street, Melbourne C1, Victoria.

or one of the Hon. Secretaries at:

- 27 Hackett Terrace, Marraryville, S.A.
- Box 1441T, G.P.O., Brisbane, Queensland
- 726 Sandy Bay Rd., Lower Sandy Bay, Hobart
- 49 Froggall St., Turner, Canberra, A.C.T.

American Ships Here for Coral Sea Week

Continued from page 17

Men who had not previously known the friendship of your people, the visit has been an outstanding experience,” he said.

“IT has strengthened the bonds which bind us in the defence of freedom throughout the world. “I spoke for all of the officers and men of the Bennington, the frigate McCain and destroyers Mullany, Stoddard and Isherwood when I say our stay ‘Down Under’ has been far too short, and that we look forward with pleasure to visiting your country again.”

The McCain, Mullany, Stoddard and Isherwood sailed earlier.

German Warship

The first warship to be built in West Germany since World War II—a 370-ton coastal minesweeper —was launched on April 1.

American ships here for coral sea week

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MAN MAKES A MOON!

An artificial satellite, a midget moon, will be hurled into an orbit 300 miles above Earth late this year, or early in 1958.

It will be an American contribution to the astonishing scientific programme of the International Geophysical Year.

The satellite—a gleaming sphere 20 inches in diameter and weighing 21 1/2 pounds — will be carried to the threshold of space by a three-stage rocket. Its orbital speed will be 18,000 miles-per-hour, and it will circle this planet every 90 minutes.

Instruments inside the satellite will radio back to Earth information about air density, temperature and pressure, the shape of the planet, the intensity of solar and cosmic radiation, and the incidence of meteors.

SHELL UMF, a new aviation fuel, is being used in development of the first-stage rocket that will carry the tiny fact-finding space-probing ball aloft.

Woomera, South Australia, may become the base for subsequent satellite launchings.

Shell serves Australia. YOU CAN BE SURE OF SHELL.