INCLUDING PROGRAMME of

DISPLAY AT GARDEN ISLAND. 12th OCTOBER, 1957

AND

OPEN DAY AT H.M.A.S. "WATSON" AT WATSON'S RAY. 19th OCTOBER, 1957

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SAILORS CAN SWIM
Disproving the old belief that sailors can’t swim, 45-year-old Commander G. Forsberg recently broke the record for the English Channel swim from England to France. His time, 13 hours, 33 minutes, was 22 minutes faster than the previous best. Picture shows him entering the water for his record swim.

THE NAVY
Australia’s Maritime Journal

OUR FIRST LINE
OF DEFENCE

So far in the relatively short history of our country, two world wars have proven the value of naval forces in the defence of Australia. But with the rapid scientific advances in machines of war, many people question the value of a navy in the defence of this country in a future conflict.

The role of the Navy remains unchanged — the defence of sea communications.

Australia is vitally dependent on overseas shipping for a stable economy in time of peace, and for the very existence of the population in time of war.

The present turnover of freight entering and leaving the country is more than 20 million tons annually. Of this, only 2,000 to 3,000 tons is moved by air.

The effort required to lift sufficient goods by air would be beyond the industrial and economic resources of the country, and therefore it is an established fact that Australia will depend on open shipping lanes and the regular turnaround of ships for many years to come.

What is the nature of the threat in the face of our sea communications?

The ocean routes of the world will be subject to attack in basically the same way as they have been in the past: firstly from underwater attack by submarines at almost any position along the route, secondly from surface attack by opposing naval forces, and thirdly by air attack from shore- and carrier-based aircraft.

The Navy is well suited as a mobile defence force to safeguard shipping from all three forms of attack.

Against the submarine menace, the carrier with its antisubmarine aircraft and anti-submarine helicopters is the only means of providing air support for convoys in mid-

October 1947

Inserted by the Petroleum Information Bureau (Aust.).


The Petroleum Information Bureau (Aust.), on behalf of the oil industry of Australia, is pleased to sponsor the cover for this issue of The Navy.

Oil gives us the fuel to drive our warships over the oceans; it is the source of the lubricating oil for engines, guns, radar, and other delicate equipment.

Because Australia is an island continent, the world’s shipping lanes are our industrial lifelines.

Without the Navy these lanes could be closed to us.

In peace as well as in war the oil industry is proud to serve the Royal Australian Navy and so serve Australia.
carrier provides a more efficient defence in the vicinity of the convoy. The longer the time spent on transit from base to task, the shorter the time spent on task, and thus the greater the number of aircraft required to sustain adequate protection. Therefore, because of our great length of coastline and because our trade and convoy routes stretch into the Indian and Pacific Oceans, it can readily be seen that for the protection of sea communications against submarine attack, carrier-based aircraft are essential.

The part the Navy plays in the protection of sea communications against surface attack has remained unchanged with the years and will be dealt with in the future as in the past by carrier-based search and strike aircraft and by surface ships. Lastly, the required protection of sea communications against shore-based attack shows the need for naval surface and air forces in their vital offensive role. It is by striking early at the aggressor and supporting land forces in amphibious operations that the enemy's advance into our outer defences can be contained, thereby denying him the opportunity to set up bases adjacent to our sea lanes in the islands to the north of Australia, as happened in World War II.

A future world conflict, which is now referred to as a global war, is a far more unbelievable and horrifying consequence than any previous war. The British statement on defence last year said: "If war should ever break out in a limited area or even in two limited areas, there is every likelihood that the capacity of our forces to cope with the situation will be taxed to the utmost. This would be a struggle for survival of the grimmest kind."

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Sandblasting the hull of a big liner in the port of Sydney.

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Lady Macquarie's Chair and Farm Cove at the turn of the Century

Scene on arrival in Sydney Harbour of the Duke and Duchess of Cornwall and York in 1901, when H.R.H. came to this country to inaugurate the Commonwealth of Australia and open its first Parliament.

In this picture, which has been kindly lent by Messrs. John Fairfax & Sons Pty. Ltd., publishers of "Sydney Morning Herald," the Royal Yacht "Ophir" (a well-known Orient liner of its day) has anchored in Farm Cove and a regatta is in progress. Lady Macquarie's Chair is seen on the left and some still familiar landmarks can be identified in the background.

This page is sponsored for the Navy League of Australia by

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AROUND THE
EIFFEL TOWER

Flying past the 985-foot-high Eiffel Tower during a recent demonstration in Paris, is the British "Skreter Mk 12" light helicopter.

Before a party of French aircraft operators and airline officials, the Skreter's ability to climb at the rate of 1,600 feet per minute, and its ease of manuverability, was demonstrated by the helicopter test pilot, Mr. K. Reed.

The Skreter is a single-engined two-seat helicopter.

THE NAVY

Engineer
Apprentices

THe call of the sea is as strong and clear today as it ever was, but this is an age of specialisation. Boys no longer run away to sea to begin their careers as cabin boys. The ships of today are complex engineering units which have to be manned by specialists in many trades.

One of the largest privately owned tanker fleets in the world is operated by the British Tanker Company, shipping organisation of The British Petroleum Company.

Four years ago, the Company instituted a new scheme for the training of engineer officers. This year the first recruits finish their course and go to sea as junior engineer officers.

Pictured on this page are (above) engineer apprentices leaving the 32,000-ton tanker British Engineer on shore leave and (right) a cheerful young apprentice on the job at sea.
WAR IN THE AIR

Air warfare is becoming an increasingly important part of naval operations. On the pilots and observers of the Fleet Air Arm in time of emergency the safety of our merchant ships on the high seas will largely depend, for it is they who will patrol the seas from aircraft carriers and play a vital part in protecting shipping from air, surface and submarine attack. They will also defend our convoys against enemy shore-based air attack and make attacks on land targets.

In addition, they will assist in covering troops trying to land on enemy-held territory, and in safeguarding our army communications and our armies in the field.

By a Special Correspondent

The Royal Australian Navy's aircraft carrier Melbourne is the most modern carrier of her kind afloat and is equipped with Sea Venom jet fighters, a ganet anti-submarine and reconnaissance aircraft. She has the latest type of angled deck which permits speedier and less-hazardous flying operations, a steam launching-catspult and mirror deck-landing sights, which eliminate most of the possibility of human error in landing on.

The Fleet Air Arm is looking for young men who wish to become pilots or observers. Applications for the next entry to the Service, in March next year, close early in January.

Applicants must be over 17 and under 24 at the time applications close and must hold intermediate certificates or their equivalents with passes in at least four subjects, including English and mathematics. Successful applicants who eventually become officers will serve for seven years from the date of their graduation, but during that period volunteers may be selected for permanent commissions.

Those who leave the service at the end of seven years will be paid a gratuity.

Those who gain permanent commissions will serve under the provisions of the Defence Forces Retirement Benefit Fund.

They will have equal opportunities with other officers of reaching the highest ranks in the Navy.

All aircrrew do three months' preliminary training at Flinders Naval Depot (Victoria), after which they are selected for training either as pilots or observers. On graduation to wings, they are promoted to acting sub-lieutenant and join sea-going squadrons. Those selected for training as observers are promoted to midshipmen, do a four months' officers' training course and a 12 months' observer course in the United Kingdom.

On graduation they are promoted to acting sub-lieutenant and join sea-going squadrons. Those selected for fighter aircraft do additional training in England.

Ganet anti-submarine aircraft (above) of the R.A.N. at target practice; (right) the Royal Navy's new Supermarine X113 ready to take off from the Ark Royal. It can carry an atom bomb.

October, 1957
OIL — the life blood of the Royal Australian Navy
OIL — the servant of our Navy, the keeper of the freedom of the seas

Inserted by the Petroleum Information Bureau (Aust.) on behalf of:

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Navy Week in Sydney

Our Navy has a vital job in peace and war

People who visit the Garden Island Dockyard and H.M.A.S. Watson during Navy Week will learn a great deal about the Royal Australian Navy and will gain a far greater knowledge than they have at present of its importance in these still-unsettled days.

Besides being able to inspect several of the most modern warships in the world, they will see some of the highly specialised equipment with which the ships are fitted and will witness spectacular displays by various naval branches.

After visiting the engineering and other workshops on Garden Island, they will realise much more than they do now how vital a part skilled civilian technicians and artisans play in supporting the Navy both in peace and war.

It is very desirable that the tasks of the Navy should be continually kept before the public mind.

The celebration of Navy Week, however, provides an excellent opportunity for laying more particular emphasis upon them.

Because of Australia's geographical situation and its isolation from other countries by vast stretches of ocean, the defence of its sea-communications is a matter of the deepest concern to the Australian Commonwealth.

Unless our long sea-lanes are adequately protected in time of war, we could be deprived of essential help from allies in the form of troops and war materials and of commodities from other lands, upon which the industrial war-effort would be entirely dependent.

In other words, we could be rendered almost impotent in the face of the enemy, unable to assist either ourselves or our friends, and possibly reduced to the unhappy position of a vassal State.

One of the greatest threats that the Royal Australian Navy and, indeed, all the navies of the Western Powers would encounter in future hostilities would be the fast, long-distance, long-submersible submarine, and for that reason the present R.A.N. has been designed and equipped in such a way that it would be ready to go into action immediately against enemy submarines, as well as other enemy forces, if war broke out.

By the Honorable
C. W. DAVIDSON, O.B.E., M.P.
Minister for the Navy

In that event, the Fleet Air Arm would have a most significant role.

The methods of war may be changed by this development, but the essential tasks of the Navy will remain those that they have always been.

The preamble to the Naval Discipline Act of the United Kingdom declares that it is upon the Navy that the wealth, safety and strength of the Kingdom chiefly depend.

With appropriate adaptation, that statement also applies to Australia.
THE BATTLE OF TRAFALGAR

By REAR-ADMIRAL W. H. HARRINGTON, Flag Officer in Charge, East Australian Area.

In October each year we celebrate the Battle of Trafalgar, a battle which has become a naval legend.

Trafalgar was a naval battle fortunate in that it gave the world freedom from major war for about a century.

In October then, we like to show you your Navy.

Even before the days of Nelson it was necessary to maintain a Navy in peace as well as in war because war at sea has always been a very technical matter.

In the first place before men can fight at sea they must learn to live at sea.

Man is not naturally a maritime creature. To enable him to live at sea it has always been necessary to adjust many of his land habits and customs.

However, life at sea moves with the times, and living conditions in our ships are improving, notwithstanding the intense competition for available space.

With us it is not guns or butter, but guns or bunkers. Too late in action to lament that we have chosen amenities instead of armament.

Competition becomes more intense as we add to the potential and intelligence of our ships by the installation of electronic machines for the control of our weapons.

Each year there are changes.

Come and see them in the ships which will be at Garden Island.

Come to H.M.A.S. Watson and see not only the modern living conditions which are now provided for Naval people, but also some of the modern devices used in Naval warfare.

H.M.A.S. Watson, which is the Anti-submarine and Radar School, has some very interesting equipment to show you.

May I welcome you then to Garden Island on Saturday, October 12, and to H.M.A.S. Watson on Saturday, October 19, to see how your modern Navy lives and works and to see the dockyard which repairs and services the ships and their equipment.

Regular sailings to
UNITED KINGDOM
and CONTINENT

PORT LINE

SHIPS AND THE STEEL INDUSTRY

Nature has distributed Australia's iron ore throughout the continent and its coking coal on the east coast. Ships — in this case mostly the steel industry's own ships — must bridge the gap.

Via Torres Strait, Yampi Sound is 2,985 nautical miles from the Newcastle Steel Works and 3,085 nautical miles from the Port Kembla Steel Works, about equal to the sea route from New York to Liverpool. Transporting ore from Whyalla to Port Kembla (1,070 nautical miles) and to Newcastle (1,170) also involves long sea voyages.

Most steel is used by industries established in capital cities around Australia's long coastline. Thus, both to bring its raw materials together and distribute its products, the steel industry relies heavily on shipping. Although operating the largest privately-owned Australian fleet of fourteen vessels, its cargoes are such that many other ships must be used.

Altogether the industry's cargoes represent a third of Australia's entire interstate sea trade.

THE BROKEN HILL PROPRIETARY CO. LTD.

28 O'CONNELL STREET, SYDNEY

October, 1957
NAVY WEEK IN SYDNEY — DISPLAY AT GARDEN ISLAND, OCTOBER 12

PROGRAMME OF EVENTS

Figures in brackets show where events take place.

10.30 a.m. Dockyard and H.M.A. Ships open to visitors.
10.45 Crane rides begin (10).
11.00 Flying demonstration by Naval aircraft, from east to west.
11.15 H.M.A.S. Warramunga fires squid (5).
11.20 H.M.A.S. Warramunga fires torpedoes (5).
11.30 Helicopter display (6).
11.50 H.M. Submarine Aurochs dives in Captain Cook Dock (1). Ships closed to visitors. Crane rides cease.
12.15 p.m. Continuous display by Naval divers begins (3).
12.30 Helicopter display (6).
12.40 Firefighting display (12). Crane rides begin (10).
1.15 H.M.A.S. Warramunga fires squid (5).
1.20 H.M.A.S. Warramunga fires torpedoes (5).
1.30 Helicopter display (6). Ships re-open to visitors.
1.45 Frogmen drop and pick up (7).
2.00 Flying demonstration by Naval aircraft, from east to west.
2.15 H.M. Submarine Aurochs dives in Captain Cook Dock (1).
2.35 Helicopter display (6).
2.45 Frogmen drop and pick up (7).
3.00 Firefighting display (12). Rescue of pilot from burning aircraft.
3.10 H.M.A.S. Warramunga fires squid (5).
3.15 H.M.A.S. Warramunga fires torpedoes (5).
3.20 Helicopter display (6).
3.30 H.M. Submarine Aurochs dives in Captain Cook Dock (1).
3.50 Firefighting display (12).
4.00 Flying demonstration by Naval aircraft, from east to west.
4.15 Frogmen drop and pick up (7).
4.30 Firefighting display (12).

KEY TO GARDEN ISLAND DISPLAYS & INSTALLATIONS

1. H.M. Submarine Aurochs dives in Captain Cook Dock.
2. Floating dock with H.M.A.S. Coonambea in dry dock.
3. Diving display.
4. Main workshop.
5. H.M.A.S. Warramunga fires squid (5).
6. Helicopter display.
7. Frogmen drop and pick up (7).
8. Apprentices display.
10. Crane rides.
13. Ferry landing.
14. Lost children.
15. Ladies' rest room.
16. First aid.

THE NAVY

October, 1957
**OPEN DAY** AT WATSON

As part of Navy Week in Sydney, HMAS Watson, the naval establishment at South Head, will be open for public inspection from 1.30 p.m. to 5.30 p.m. on October 19.

It is easily reached by buses from Central Railway (Eddy Avenue) and tram from Queen's Square, which terminate almost at the gates of the establishment.

Car drivers should use the second gate.

Car drivers will find ample parking facilities near the Torpedo and Anti-Submarine School, which is the most modern of its kind in the British Commonwealth.

Visitors may see how mines are laid and swept, how a submarine is detected and destroyed, and how demolitions are carried out.

All the real weapons are on display, including devices that are mortar shells and rockets against submarines and the set that finds submarines for the hunter ship, Msle.

In the meantime, it had also become the training centre for navigation, and became known as the N.D. School, which, in peace and war, has supplied nearly 7,000 men fully trained in radar and navigation to the Australian and Allied Navies.

For many years the Torpedo and Anti-Submarine School had been based at HMAS Rushcutters, but the growing importance of this branch soon showed the need for a larger and more modern school.

Watson underwent a further enlargement, and in 1956 the T.A.S. School moved into its new block. This was soon followed by new accommodation and amenities blocks.

Today Watson is in full garrison, and will eventually become one of the leading Naval establishment in New South Wales, and one of the most up-to-date and comfortable in the Navy to-day.

**History of Watson**

There will be three information centres for the benefit of visitors, and four refreshment points, two of which will command some of the finest views of the harbour in Sydney.

Watson was formed in the early years of the Second World War as the Radar School, when the new invention first came into service in the R.A.S.

At this time it consisted of one block of buildings and only two radar sets.

There was no accommodation, and many had to live at HMAS Penguin, at Balmain, which meant that when the weather was too bad for boats the classes had to use public transport, not arriving at their work until nearly lunchtime! However, the establishment was enlarged considerably in 1944, and in 1945 it was officially commissioned as one of H.M.A. ships.

**The Ship's Crest**

Watson, in her short life, has worn two completely different crests. The first was a design of thunderbolts and a flying bat, which also uses the principles of radar to find its way. The present crest of Captain Philip's ship, H.M.S. Sirius, was a Mr. Watson, who later became the first lighthouse keeper on South Head. The present crest of H.M.S. Watson, therefore, shows this lighthouse, which is surrounded by the Naval Crown, made up of the sails and high hoops of another age, which has been used by the Navy since the days of Drake.

The First Lord of the Admiralty, Lord Selkirk, announcing this, said that "great importance" was attached to the project.

A ship such as this, he said, "will make a good contribution to the peace of the world — a contribution in no way diminished by the development of inter-continental ballistic missiles.

It was announced last June that the Royal Navy's ship-to-air guided missile, Sealion, would be fitted to four guided weapon destroyers which had already been placed on order.

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**LOCATION OF INSTALLATIONS**

Figures and symbols refer to corresponding figures and symbols on the map above:

- E. Entrances.
- C. Car parks.
- L. Ladies' toilets.
- R. Refreshments.
- T. Train terminus.
- G. Gents' Toilets.
- B. Bus terminus.
- K. Lost children.
- F. First Aid Posts.
- G.M. DESTROYER BEING BUILT

**NAVY WEEK IN SYDNEY**

**MAP OF H.M.A.S. WATSON**

**G.M. DESTROYER BEING BUILT**

Britain's first guided missile destroyer is now being built.

The First Lord of the Admiralty, Lord Selkirk, announcing this, said that "great importance" was attached to the project.

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**THE NAVY**

October, 1957
GUNPOWDER worked the engine

Can you imagine driving up to a keg of gunpowder in a service station and asking the attendant to "Fill 'er up"?

It might have happened — if science hadn't stepped in.

For gunpowder was the fuel used in what historians believe to have been the first effort to obtain continuous motive power.

Christian Huygens, a Dutchman, is credited with trying out the idea about 1680.

Whether or not he blew himself up is not recorded, but for good reasons his example was not followed in later and more successful engines.

Believe it or not, modern petroliums contain more energy per pound than T.N.T. or any other modern high explosive. The energy they develop gives a steady propulsive force on the engine piston, whereas T.N.T. explodes instantaneously with a shattering, rather than a propulsive, force.

SHELL research is always on the job checking the quality of the fuels and lubricants used in modern high-speed internal-combustion engines.

The development of the unique Shell additive, I.C.A. (patented throughout the world), has been the most significant contribution of recent years to improved engine performance.

Shell Serves Australia . . .
YOU CAN BE SURE OF
OLD SALT — NEW SALT:

A Naval College cadet learns about knots and splices from his instructor.

By a Special Correspondent

Next January a group of light-hearted boys will move into the Royal Australian Naval College, put aside their civilian clothes, and begin a career in the Navy.

Chosen with painstaking care from all over Australia, these boys are the future officers of the Service. Perhaps among them may be an admiral of the atomic age.

Although the College was established as recently as 1913, it has already produced five admirals and a large number of other senior and less-senior officers who have distinguished themselves in war and won high service decorations.

Boys eligible to enter the College are those within two age-groups who can attain, or have already attained, certain educational standards.

The “normal entry” is for those who are between 15½ and 16½ in January of the year they enter the College and who can pass an examination about equivalent to intermediate standard.

The “matriculation entry” is for those who are not older than 19 in January of the year they enter the College. They must have passed the matriculation examination for an Australian University or intend sitting for it in the year they appear before the College interviewing committee.

Boys of both entries join the College in January each year.

Applications close in the preceding June.

At the College they are given free education, books, clothing, maintenance and a financial allowance for cadet-midshipmen.

Cadet-midshipmen of the normal entry remain at the College for three years. Matriculation entry cadets remain for three terms — amounting to about 11 months.

Cadets of both types of entry then do three months' basic sea training in an R.A.N. training frigate. After this and after they have passed a seamanship examination they are promoted to midshipmen and go to the United Kingdom for further training at the Royal Naval College, Dartmouth.

This part of their training takes 16 months. They are then promoted to acting sub-lieutenants and go to sea in ships of the Royal Navy or the Royal Australian Navy for periods ranging from four months in the case of electrical specialists to three years in the case of seamen.

Electrical specialists then do a refresher course at Flinders Naval Depot (Victoria) in preparation for an Electrical Engineer degree course at an Australian university. Engineer specialists do a professional course at the Royal Naval College, Manadon.

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October, 1957
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October, 1957
AFLOAT SUPPORT

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Naval units, dispersed and under way, do not offer a worthwhile target for atomic weapons.

These advantages, however, would be nullified if the Navy were unable to keep its ships supplied at sea.

For this reason, the "fleet train" is a highly important factor in naval strategy.

The fleet train can best be described as a mobile source of fleet supply which enables a task force to remain at sea, far from its base, almost indefinitely.

Before the establishment of fleet trains, a warship could only operate efficiently up to 1,000 miles from base. Today the distance is immeasurable.

Two things have brought about this change: the change from coal to oil, which has greatly increased the operating range of ships, and the ability of oil tankers to supply fuel to ships while still under way.

Consequently, a most important factor in a fleet train is the oil tanker, which, in addition to carrying fuel for the ships themselves, can also carry fuel for the aircraft of the task force's carriers.
H.M.A.S. QUADRANT UNDERGOES TILTING TEST AT GARDEN ISLAND

The angle at which she listed caused many people to ring Naval Headquarters anxiously.

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October, 1957
BATTLE OF THE NILE

Master's Medal

The medal reproduced here by courtesy of Mr. Kenneth C. Bruff Macdonnell, of Sydney, grandson of Mr. Bruff, Master of one of Nelson's ships, "Orion," as the Battle of the Nile, has come down to Mr. Macdonnell as a family legacy.

"Orion" carried 74 guns with a complement of 500 men and was commanded by Captain Sir James Saumarez. of Norman descent but born in the Island of Guernsey.

A distinguished naval officer, he engaged in naval actions was not exceptional, but the gift after the Battle of the Nile, has come down to Mr. Macdonnell as a family legacy. The medal reproduced here by command of Mr. Kenneth C. Bruff Macdonnell, of Sydney, grandson of Mr. Bruff, Master of one of Nelson's ships, "Orion," as the Battle of the Nile, has come down to Mr. Macdonnell as a family legacy. The medal reproduced here by command of Mr. Kenneth C. Bruff Macdonnell, of Sydney, grandson of Mr. Bruff, Master of one of Nelson's ships, "Orion," as the Battle of the Nile, has come down to Mr. Macdonnell as a family legacy.

Mr. Bruff, Master of one of Nelson's ships, "Orion," as the Battle of the Nile, has come down to Mr. Macdonnell as a family legacy.
The Navy needs technicians

In July last year the Royal Australian Navy entered the field of apprenticeship training.

H.M.A.S. Nirimba, at Quaker's Hill, near Blacktown, N.S.W., with its workshops and spacious grounds, was handed over completely for this scheme.

Here are being trained the naval artificers of the future.

The Navy has found that there is a definite limit to the type and number of skilled tradesmen available to join the Service as fully qualified artificers—in fact, there are hardly enough to fill the needs of our rapidly growing industrial strength.

In addition, the years since the end of World War II have seen a rapid change in all manner of engineering processes, particularly in the field of electronics, propulsion, ship and aircraft design. A new era of atomic power is close at hand.

The Navy needs artificers capable of the finest workmanship, working to close tolerances in maintain complicated mechanisms.

The aim of the Naval apprentice training scheme is to take in lads of between 15 and 17 who have been trained to sub-intermediate standard or preferably higher, and give them a four years' course in school, technical and workshop subjects, followed by eight years' practical experience in H.M. Australian ships.

After the first six months' basic training the boys are selected for the various trades taught, great consideration being given to the apprentice's own choice.

The types of training available are for fitters and turners, boilermakers and welders, shipwrights, electrical fitters, ordnance artificers, aircraft fitters, as well as some who will specialise in electronics and radio equipment.

By a Special Correspondent

During training at H.M.A.S. Nirimba, each apprentice is given sufficient schooling to enable him to complete his trade qualification and will have reached a standard acceptable to industry and the trade unions.

In addition, avenues of promotion to commissioned rank in the Fleet Air Arm or cadetships at the Royal Australian Naval College are available during training at H.M.A.S. Nirimba. Later, promotion to commissioned rank on completion of training is open to apprentice apprentices who reach the required standard.

During this initial four years' period food and accommodation are provided, as well as a complete kit of clothing.

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APPRENTICESHIP is available at Garden Island Dockyard, Sydney, controlled by the Commonwealth Government, under conditions which will enable you not only to become an efficient tradesman but give you the opportunity of qualifying as a Draughtsman in Mechanical or Electrical Engineering, or Ship Construction. The period of apprenticeship is for 5 years and subject to satisfactory progress. Technical College fees will be paid by the Commonwealth Government.

RATES OF PAY are in accordance with the Arbitration Court Award made between the Department and the Trades Unions. On completion of the first year, an additional weekly payment is made, subject to satisfactory progress. Three weeks' annual leave and liberal sick leave are granted and an allowance is payable to apprentices who are obliged to live away from home owing to distance.

ELIGIBILITY. Age limit is 15 years and under 17 years at date of taking up appointment. A satisfactory pass at the Intermediate Certificate Examination is desirable, but not essential.

APPLICATION must be made on the form prescribed. For application form and copy of conditions of entry, apply to your District Employment Office, or the General Manager, Garden Island Dockyard, Sydney.

Apprentices keep fit is free. It costs nothing. Each apprentice receives £2/19/1 per week, rising to £4/16/7 a week in the fourth year, with an additional 3/6 a week to those over 18.

Other allowances are paid to meet expenses of hair cuts, personal laundry, etc., and during leave periods apprentices get an extra living-out allowance of 3/3 a day.

Free medical and dental services are also provided. Apprentices get two leave periods of three weeks each, with free return travel to their homes.

Those who have to go long distances are given extra travelling time. The establishment is well fitted out with workshops and machine tools of all description and the boys are taught by skilled instructors, both civilian and Naval. Emphasis is placed on thorough schooling, laboratory demonstration and then workshop supervision of all technical processes.

A technical reference library is available and much use is made of instructional films.

Please turn to page 42

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October, 1957
The Navy needs technicians

From page 40

The Navy League of Australia sponsors

The Australian Sea Cadet Corps and administers it jointly with

The Commonwealth Naval Board

The Navy League and the Sea Cadet Corps welcome your interest and extend an invitation to you to join and, if possible, take an active part in their work.

The OBJECTIVE of the Navy League of Australia is to keep before the public the importance of maintaining SEA POWER.

To exercise sea power effectively, a nation must, in time of peril, be able to keep the sea communications open for its own use and, at the same time, substantially deny them to the enemy.

To AUSTRALIA, an island nation, SEA POWER is absolutely VITAL. To appreciate how vital, imagine, for example, the effect upon your manner of living should Australia be unable to import petrolium, phosphates, rubber, and tea; to export its surplus wool, wheat, meat, and minerals; or to transport coal, iron ore, potatoes, and sugar around its 12,000 miles of coastline.

The essential elements for the exercise of sea power, both in peace and war, are a Merchant Navy, the Royal Australian Navy, Naval Aviation, Bases, and the Industrial potential to maintain these elements. None can be developed overnight.

The fundamental factor in all these elements is PERSONNEL. Without men to run and effectively use them, ships and aircraft are useless. So important is this development of personnel that the Navy League of Australia — it has a Division in every State — sponsors the Australian Sea Cadet Corps, which it administers jointly with the Commonwealth Naval Board.

The SEA CADET CORPS is a youth organisation, for lads between the ages of 11 and 18, which aims to foster and develop the inherent love of the sea that exists within the majority of us.

At its training establishments, not only is elementary seamanship taught, but good citizenship is engendered by the teaching of First Aid, swimming, self-discipline, etc., whilst leadership and self-reliance are developed by physical training and taking charge of classes or of boats. Not all will wish to follow the sea for their livelihood, but the League and Corps will help those who do.

REMEMBER! Sea power is essential for the well-being and safety of Australia, the British Empire, and our Allies.

"KEEP WATCH" with Navy League by joining today. Nomination forms are obtainable from: The Secretary, Navy League (N.S.W. Division), 85 Pitt Street, Sydney. Postal address: Box 1718, G.P.O., Sydney. Telephone: BU1771. For other States, refer to the front of this magazine.

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THE NAVY
Australia's Maritine Journal

SPUTNIK CASTS
A GRIM SHADOW

LAST month Russia thrilled the world with her successful launching of the first man-made earth satellite.

It was a scientific accomplishment of the first magnitude, and for that Russia should receive the plaudits of the world.

In a world free from fear of war that would be given without stint. But the little metal sphere had scarcely settled into its orbit around the earth before the average man and woman of the democratic countries were reminded of the immense military significance of this Russian achievement.

If Russia could power a rocket to break through the earth's gravitational pull, then she had the know-how of the I.C.B.M. — the intercontinental ballistic missile—a weapon sought by the big military Powers as avidly as the philosopher's stone was sought by the alchemists of old.

Sputnik showed that when Russia, some weeks before, laconically announced that she had developed the I.C.B.M. she wasn't fooling. And in a moment's fraction of military power in the world had dipped deeply in Russia's favour.

However, we should not let the awesome light of the artificial moon blind us to the realities of our immediate military problems.

America is well advanced in preparations for her own earth satellite and, despite the laudatory attributions of her Atlas 5,000-mile-range ballistic missile, there is every indication that she will soon draw level with Russia in space flight achievement.

When that happens, use of the I.C.B.M. by either side will mean a war of extinction. Like the H-bomb, the I.C.B.M. may well provide its own deterrent to its use in war.

But the likelihood of "local" war still remains—war like that in Korea, Indo-China, and Malaya.

For us in Australia particularly it is of more pressing urgency, to build up modern, effective "conventional" defences than to shudder at the shadow of Sputnik.

And the sea is our first line of defence.
Britain's War deterrent

Britain's successful development of the hydrogen bomb this year profoundly affected the balance of world military power. It strengthened immensely the strategic position of the Western powers.

It caused Britain's American ally to regard her with increased respect—which in the long run will almost certainly lead to greater willingness by the United States to cooperate with Britain in scientific military projects.

The pictures on these two pages show the enormous power of Britain's nuclear weapons.

Above is an official picture of Britain's first H-bomb explosion, in the Christmas Island area.

Left is the third H-bomb explosion in the Christmas Island test series.

At right, on the opposite page, is Britain's latest atomic explosion, at Australia's Maralinga proving ground last month.
RUSSIA'S INSHORE NAVAL FORCE

By J. MEISTER — in London

WHILE the results obtained by cruisers, destroyers and submarines in past wars were rather disappointing, the Russian inshore naval forces—gunboats, minesweepers, motor gunboats, motor torpedo boats and patrol launches—often fought very stubbornly and obtained some honourable successes.

These inshore squadron actions, which are most often combined with mine warfare, coastal artillery and, during the two world wars, the naval air force,

most of the fighting took place within the covering range of Russian coastal batteries and minefields, and very seldom were offensive sweeps undertaken by light Russian naval forces.

During the Crimean War, before the British Ambassador to Russia estimated that the Russians might have as many as 180 gunboats in the Baltic; and, owing to the lack of such vessels in the British and French navies, the Allied powers were unable effectively to blockade the Russian coasts, although the Russian Navy remained completely inactive.

In the Black Sea, however, Allied naval and land forces forced the entrance to the Sea of Azov, and 14 small British and four French warships destroyed within a week over 500 Russian merchant ships, huge amounts of food and supplies, 340 guns and 14 Russian warships.

During the war of 1914-17, the First World War saw the Russian gunboats and torpedo boats, under the first Whitehead torpedoes.

During the defence of Port Arthur, gunboats and torpedo vessels several times shelled the seaward flank of the advancing Japanese troops and successfully defended the entrance to the port against repeated Japanese blocking attempts; and for the last surviving vessels, including the battleship Vesuvius, fought off for six nights by attacks by Japanese torpedo boats, before being scuttled prior to the capture of the doomed fortress.

The First World War saw the tenacious defence of the entrance to the Gulf of Riga against superior German naval forces. In August, 1915, two German battleships, four cruisers and 33 torpedo boats, supported by many minesweepers and auxiliaries, were to force the Russian mine and coast artillery defences in the entrance.

Of the 20 Russian torpedo boats, four gunboats, one old battleship and minelayers in the Gulf, only two gunboats and the battleship Salavat were immediately available to repulse the first German attack.

After a few days and considerable losses, due to Russian mines, the German vessels broke through and the two battleships, in sharp night action in the Gulf of Riga, destroyed the Russian gunboat Sivash; but afterwards, when the Russians and other Russian submarines appeared, the Germans evacuated the Gulf. German naval forces only reentered the Gulf of Riga after the outbreak of the Russian revolution and this time the Russian ships did not show much fight and soon retreated.

During the Civil War and again during Allied intervention, the Soviets proved their considerable ability to create and use local naval flotillas of miscellaneous ships.

Though British motor torpedo boats made several successful raids against Kronstadt and on the Dvina River and even in the Caspian Sea, none of the modern warships in the hands of the Red Army survived—in very poor condition, but still preserved for the future.

BESIDES the flotillas on the Dvina and the Dnieper of western Russia, created during the war of 1914-17, a Dnieper Flotilla operated against Poland in 1920, and many gunboats were commissioned on Lake Onega, Peipus and Baikal, and most of the Russian rivers.

The Amur Flotilla played an important role during the armistice of 1920 against Chinese troops in Manchuria, and later during the violent clashes between Japanese and Russian warships in 1938-39 on this river and on Lake Chanka. Soviet vessels seem to have mostly been on top in these fights.

The real test came during World War II. When the Germans were unable to capture Leningrad in 1941, and the Soviet heavy naval forces were sunk, damaged or just idle, converted gunboats, minesweepers, armed launches, motor gunboats and motor torpedo boats defended the sea lanes between Leningrad, Kronstadt and the islands as far as Lavan-saar.

WHILE the Soviet Navy had been unable to protect the Gulf of Riga and the Baltic Islands, it was now at least in a position to ensure the supply of the outlying island garrisons and the Orenburg/Cauldon, although German and Finnish mineswepters and motor torpedo boats often visited these Soviet-controlled waters.

In the Black Sea in 1941-42 the Germans had not much difficulty in annihilating the Soviet coastal forces off Nicalet, Sevastopol and in the Sea of Azov, but as against the German Army the Soviets could not conquer the Caucasus, many Russian small craft were available as in the past, but still the Germans were able to hold part of the shores of Lake Onega and Lake Ilmen, while the Caspian Flotilla transported the important oil from Baku to Astrakhan, and the Volga Flotilla sup-

much dash and courage, but always without any tactical skill. The small Soviet motor torpedo boats had petrol engines and easily caught fire; still the Germans were surprised to note off the North Norwegian coast how far from their bases these not very seaworthy craft operated.

The best designed of all small Soviet naval weapons was the armoured motor gunboat, flat-bottomed, with turrets from army tanks, and notable speed. The Germans had nothing equal to oppose, and their lightly armed minelayer launches

TRAINING IN SAIL

Despite its building programme of nuclear-powered ships, the U.S.A. still has this 295-foot training barque, the Eagle. The "Sydney Morning Herald", which published this picture last month, said that no fewer than 33 sailing ships are devoted to naval training in the wartime nations of the world.
In the summer of 1942 the Axis powers decided to stop this traffic and to make the blockade tight. Without supplies, Leningrad was bound to fall within a short time, and the fall of Leningrad meant also the collapse of the Soviet front from Murmansk to Lake Ilmen and the destruction of the rest of the Baltic Fleet. It might have changed the outcome of the war in the East.

The very weak Finnish naval forces were, therefore, strengthened by four Italian motor torpedo boats, four German mine-laying launches and about 20 gunfighters manned by German Air Force personnel.

But while the Axis forces were not suited for the task, they suffered many mechanical breakdowns, and were generally ineffective. The Soviets surprisingly enough showed much initiative and even tactical ability, repulsed some German and Italian attacks and kept the lifetime to Leningrad open.

On Lake Ladoga the Soviet Navy definitely had the upper hand, and their heavily armed gunboats and motor gunboats remained masters of this very vital lake.

Of all classes of Soviet surface vessels, the motor torpedo boats were by far the most successful. They and the gunboats, motor gunboats, minesweepers and patrol launches did almost all the work the Soviet Navy carried out during the Second World War, while the heavier ships just provided fat targets for German aircraft and mines.

But the influence of the Soviet coastal forces remained almost exclusively defensive and restricted to zones very near the shores controlled by the Soviet Army.

Russian small craft were not only well adapted for the shallow coastal waters, they were also very numerous. While in peace time the major sea powers possessed only a few vessels for insuace work, the Russians did not rely upon building such craft after the outbreak of war only, but kept up to 250 motor torpedo boats and 300 motor gunboats and patrol launches in service prior to 1941.

Not withstanding heavy losses, the figures at the end of the war might even have been higher.

Today Soviet Russia has an estimated 1000 motor torpedo boats, motor gunboats, coastal submarine chasers and patrol launches.

BRITAIN is the only N.A.T.O. sea power which owns light naval forces which might operate in Russian coastal waters, if any nearby base could be secured; and the new German Navy may also include such small craft.

But all other N.A.T.O. powers, and above all the U.S. Navy, have neglected to build in peace time more than a few experimental small craft.

The bulk of the responsibility for coastal warfare near a Russian-controlled shore may therefore well fall upon the Royal Navy.

Nevertheless, from German experience during the last war, it can be said that yet more small craft should be available, and that a shallow draught, armoured and heavily armed motor gunboat (guns and rockets) should be developed.

Although the Soviets may not make full use of their strong coastal forces in offensive sweeps, they will certainly defend the approaches to Russian coastal waters and the main ports and naval bases. Allied losses when trying to penetrate the Russian maritime perimeter will be high, and such operations need well-placed bases and air supremacy over the land-based Russian Air Force.

Admiral Napier, in 1854-55, had only three requests to address to the British Government—sailors, pilots and gunboats—but none could be satisfied before the war was over, and the results of the naval operations remained, therefore, very unsatisfactory.

During the First World War, the German Navy suffered from the lack of small gunboats, while the British Navy, during the intervention, had to use some river gunboats, but this was a typical emergency solution only.

Finally, from 1941 to 1945, German naval officers complained bitterly about the lack of suitable craft, which was not overcome up to the time of the German capitulation.

The same problem has turned up, except each time operations have had to be undertaken in Russian coastal waters, and though a saying goes that nothing is ever learnt from history, in the end there must be some exceptions. Russian coastal craft may use small and hidden bases, and they do not form, when dispersed, interesting targets for atom bombs.

To combat them, similar craft will still be needed, if possible in larger numbers.

—From the London "Navy".

THE NAVY

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MARKETING COMPANIES:
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Atlantic Union Oil Company Pty. Ltd.
Caltex Oil (Australia) Pty. Ltd.
H. C. Slaigh Ltd.

REFINING COMPANIES:
Australian Oil Refining Pty. Ltd.
BP Refinery (Kwinana) Ltd.

Neptune Oil Company Pty. Ltd.
The Commonwealth Oil Refineries Ltd.
The Shell Company of Australia Ltd.
Vacuum Oil Company Pty. Ltd.

November, 1957.
GUIDED MISSILE SHIP

Britain's guided weapons trials ship, H.M.S. Girdle Ness, fires a Seaslug medium range ship-to-air weapon. The missile has been designed to engage any enemy bomber which evades the fighter defences of the Fleet. Seaslug missiles are fired from a triple ramp launcher, automatically fed from a magazine below decks. Targets are plotted by radar.

NEWS that Messrs. Cammell Laird of Birkenhead are to build the Navy's first guided missile ship was given by the First Lord of the Admiralty at the luncheon following the handing over to India of the cruiser Nigeria.

At the present time, Messrs. Cammell Laird have three submarines and one frigate under construction, and the firm has made the Nigeria, henceforth to be known as H.M.S. Mysore, virtually a new ship.

Now the firm is about to usher in another era of shipbuilding by constructing the first guided missile destructor, which will bear the proud name of Devonshire.

The future of steam for marine purposes...time has proved the service is met by the latest Babcock developments...Over 50 years' sea experience. At sea.

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NATO'S NAVAL TASK

By Rear-Admiral A. D. NICHOLL

During the second half of September four large-scale training operations were carried out by the navies and maritime air forces of the Atlantic alliance. Three of these exercises, named Strikeback, Sea Watch and Stand Firm, took place in the Atlantic, the fourth, called Deepwater, in the Mediterranean.

A NATO defence plans are based on the assumption that the allies would continue to control the sea routes in the event of war and that the vital supplies of raw materials and food would continue to reach Western Europe by the Atlantic and Mediterranean.

The basic aim of NATO is to prevent war and the allied power of retaliation with nuclear weapons is the main deterrent to aggression.

The deterrent might fail, however, and it would then be the task of the allied forces not only to make immediate retaliation but also to deal with the immense problems which would follow the use of nuclear weapons by both sides.

None of these problems would be more complex than those facing the NAVO navies and maritime air forces.

There would be three main immediate tasks. The first would be offensive in character and would consist of the NATO navies' contribution to the nuclear retaliation and offensive strikes from the sea against enemy advances.

At the same time, these nuclear attacks, which would concentrate on enemy ports, bases and airfields from which the enemy's threat to the allied shipping would emanate, would be a valuable contribution to the defence of shipping.

This task was the basis of Exercise Strikeback, in which nearly 140 allied warships took part.

The allied striking fleet consisted of six United States and three British aircraft carriers whose task was to reach an area from which they could launch bombers armed with nuclear weapons against simulated targets in the United Kingdom and Western Europe and also strikes in support of the Norwegian Army defending their homeland.

It was, of course, assumed that the enemy would make every effort to prevent the striking fleet from carrying out its task, and strong forces of submarines and bombers assumed to be carrying nuclear weapons were sent against it.

A large carrier striking force can carry out a wide range of offensive and defensive tasks as well as its mobility provides the possibility of evading attack. The force provides its own aircraft for air and anti-submarine defence, working in conjunction with its surface escorts of cruisers and destroyers.

Flexibility in the handling of the various types of aircraft is conferred by the fact that United States and British carriers are operated on identical lines and can use each other's flight decks for launching or flying on whenever desired.

Offensive operations are, of course, only part of the naval task.

On the outbreak of war, immediate steps would have to be taken to safeguard the allied shipping.

There would be two closely allied tasks: First, the control and protection of all shipping underway; bringing essential supplies to Western Europe, and the protection of emergency unloading arrangements where necessary; and, second, arrangements for the safety of merchant shipping in European ports, for organising it into convoys and sailing it away from the threatened area as soon as possible.

These tasks were envisaged in Exercises Stand Firm and Sea Watch, respectively.

A particular feature of Exercise Stand Firm was the cooperation between the allied naval authorities and the civil organisations concerned with merchant ships, fishing vessels and ports.

They also provided valuable practice for land-based bombers and reconnaissance aircraft in locating and attacking sea forces and they exercised the air defence of Britain and Western Europe in detecting and meeting attacks from the sea.

The exercises were designed not to find out whether a certain type of operation would succeed or fail in the face of a given scale of opposition, but rather to test the NATO Naval Commanders as realistically as possible with the problems with which they would be faced at the outset of a world war, to test the organisation and communication system which the allies have developed, and to provide intensive training for the crews of ships and aircraft in their wartime tasks and in working together as a unified naval force.

November, 1957.
Navigating by Radar

RADAR has gone a long way since the first air warning sets began to appear round the coasts of Great Britain shortly before the last war.

In the 20 years that have elapsed since then it has been used for many different purposes: on land, at sea and in the air, the basic components of the equipment remaining the same but the design being varied to suit the particular purpose required.

Radar at sea was developed for, and to a large extent by, the Royal Navy during the war. The first sets were intended to detect enemy warships during darkness or fog; they were unable to give a very precise indication of the direction of the enemy ship, although right from the start its range could be measured accurately.

This was a most important virtue of radar, as visual range finders have never been very accurate at long ranges or in poor visibility, and radar was able to meet this deficiency.

Then came the development at an English university of the cavity magnetron valve. The frequencies of the radio waves sent out by radar sets were already higher than those used for normal wireless transmissions, but this made it possible to use higher frequencies still.

It thus became practicable to produce a radar set which was much more highly directional, and was also capable of detecting much smaller objects.

The set which resulted was rushed to sea in escort vessels, and allowed them to detect the German U-boats which were then making a practice of attacking merchant convoys on the surface by night.

This set was the progenitor of the modern navigational radar sets now used in merchant ships — and indeed in warships as well. Since those early days, naval radar has developed in three main channels, dictated by the three main uses of radar in warships. One is for the control of guns, both against surface and aircraft targets: one is for giving warning of the approach of an aircraft; and one for keeping a general watch on the surrounding waters.

Among other uses, mention may be made of sets to find the height of enemy aircraft, while aircraft of the Fleet Air Arm have radar sets for a number of purposes.

Navigational radar as used in the Merchant Navy is derived from the general purpose naval set mentioned above, which is itself descended from the first anti-U-boat set brought out so quickly during the war.

The information which any radar set gives is displayed to the user on a cathode ray tube not unlike that of a television set.

The picture on the tube face takes the form either of some sort of graph or of a plan of the surroundings of the set (but not necessarily of the photographic type of picture which you see on television).

In the case of the general purpose naval radar sets, the plan type of display is used. The centre of the tube represents the position of the observer’s own ship, and other ships, aircraft, or objects such as buoys appear as spots of light on the dark screen, in their correct positions according to the scale used for the display.

Land will also be shown on the display if it is within range, provided that the coastline is sufficiently rugged in shape to reflect back the radar beam. Where the coast is low-lying, it may be the hills inland that are seen.

An instrument of this sort clearly has enormous possibilities as a navigational aid in darkness or fog. Approaching ships cannot be detected in time to avoid them, while if the shape of the coastline can be recognised, the position of the ship can be found by measuring the bearing and distance from some prominent object like a headland.

Naval radar was being extensively used in this way by the end of the war, and when peace came the Admiralty made available to merchant ships a large number of surplus radar sets of a type used in Coastal Forces craft, which were reasonably well suited for navigational work.

At the same time, several of the firms which had acquired experience in radar design during the war were working on the production of sets designed especially for merchant ship use, and before very long commercial concerns had replaced the Admiralty equipment.

Radar of one sort or another is made by a good many electrical firms in Great Britain, but not all of them have concerned themselves with marine navigational radar.

Those that have include such well-known names as British Thomson Houston, Decca, Kelvin Hughes and Marconi. British marine radar has to conform to certain standards set by the Ministry of Transport in order to obtain a certificate of type approval, and although it is not legally necessary to have such a certificate it is in practice obtained by all firms.

The equipment is thus of proven high standard, and this guarantee of merit has unlikeliness been of great assistance in promoting sales of British marine radar equipment abroad.

Use increasing

In British ships, the fitting of radar is steadily increasing, and new ships of any size either enter service without it. In fact, it is probably true to say that the majority of British ships without radar are old vessels on which their owners are unwilling to spend much money, and that as these vessels are replaced the use of radar will become general in the British mercantile marine. This is not, however, to say that it will become universal at sea.

Shippers of some foreign countries tend to run older ships and to spend a good deal less on them than do their British counterparts.

The years since the war have seen a fair amount of change and a great deal of improvement in marine navigational radar.

It may be interesting to review the changes that have taken place and to examine possible future trends. Initially, improvements were in the direction of increased reliability, and then simplification of the electrical circuits.
Japanese Warship Near Completion

The escort destroyer Ayanami, launched last June, is rapidly nearing completion. She differs in profile from the earlier Akahone type in having a forecastle carried after for two-thirds of her length, her dimensions being 357.7 x 53.1 x 26.7 ft. with a displacement of 1,700 tons. Engined by twin turbines of 53,000 s.h.p., the designed speed is 32 knots. A.35,000 s.h.p., the designed speed is two-thirds of her length, her large hangar houses, and in their launch, one of the two, they spent 128 days at sea.

Four Destroyers for Turkey

Four British destroyers, the Milne, Matched, and Marine, have been transferred and are to be extensively refitted for service in 1958 at a cost to the Turkish Government of £1 million. They carry six 4.7in. in three large gunhouses, and in their day ranked with the finest looking destroyers afloat. All performed outstanding war service.

France Begins Work on Atom-sub.

Work has begun on the construction of a French nuclear-powered submarine at present known as Q.2/4. Natural uranium is stated to be the atomic fuel.

The fast escorts Kersaint and Vanquelin have returned from a 24,000 mile cruise in the Indian Ocean during which they spent 128 days at sea. They tested the behaviour of ships of this class in tropical conditions, and brought back very satisfactory results, although off Durban they had met with heavy seas with waves up to 45 ft. The submarine Blaison, formerly U.125, has been placed in reserve prior to being condemned. Two new colonial sloops (or escort vessels) of the "Commandant-Riviere" class have been ordered and named Esmerin and Henry.

Three "Europe" type minesweepers, D.25, D.26 and D.27, built at Cherbourg under the Off-Shore Procurement, are to be transferred to Yugoslavia in September.

A new "batyscaphe" is to be built by the French Navy and is numbered as F.N.R.S.3 (Fonds National de la Recherche Sous-Marine). This craft should be able to dive to about 33,000 feet, with the object of exploring the Philippines Trough, which is believed to be the deepest in the world.

Lieutenant-Commander Houtot, who dived 363 metres in the batyscaphe F.N.R.S.3, is in charge of the new craft.

U.S.A. May Adopt Another R.N. Device

The U.S. Navy may adopt yet another British carrier device. This is the positioning roller system, which considerably increases the speed at which aircraft can be launched by catafut.

U.S. eyes were fixed on the positioning system during the recent exercise in the Western Atlantic, when aircraft from the 60,000-ton Saratoga operated from the decks of H.M.S. Ark Royal. At the same time, British naval aircraft operated from the Saratoga.

The rate of launching from the Ark Royal was, for catapult, higher than that for Saratoga, the launching time, at the peak of operations, being between 15 and 20 seconds. Some aircraft operated by the U.S. Navy are heavier than those in service in the Royal Navy. For this reason, it may not be possible for the Americans to adopt the system exactly as fitted in British carriers, but the increase in speed of the device makes it probable that the idea will be adapted to meet the special requirements of the U.S. Navy. This would be the fourth British carrier device to be incorporated in the U.S.S., the other three - the steam catapult, the angled deck, and the mirror landing aid - having immeasurably increased the effectiveness of aircraft carriers in both the Royal Navy and the U.S. Navy.

A.S. Aerial Torpedo Made in Australia

An anti-submarine aerial torpedo recently produced by the Royal Australian Navy Torpedo Establishment in Sydney for the Fleet Air Arm has undergone successful trials.

The Minister for the Navy, Mr. C. W. Davidson, said that the details of the torpedo must remain secret, but it could be revealed that it had remarkable striking power and could be launched with great accuracy. It had been designed primarily for use in the Fleet Air Arm's Gannet turbo-prop anti-submarine aircraft.

To obtain technical information and experience that would enable them to produce the torpedo, the Superintendent of the Royal Australian Navy Torpedo Establishment, Captain W. J. M. Armitage, and two production executives visited the United Kingdom some time ago.

The Australian Commonwealth Naval Board had considerably all their interest shown in its production and tests. Mr. Davidson said the new weapon was much more complicated than the aircraft torpedoes which the Torpedo Establishment made for the Royal Navy and the Royal Australian Air Force in World War II, and the fact that it could be made in Australia by Australian technicians would be of major interest to Australian industry.

He said that in 1952 the R.A.F. Torpedo Establishment produced the first 21-inch diameter standard surface-torpedo made in Australia.

"In the event of another war, the Royal Australian Navy will be able, with the help of outside industry, to supply not only its own ships and aircraft, but also to assist in supplying the navies of other parts of the British Commonwealth," the Minister added.

Most Likely Attack is by Submarines

The Australian Government's Naval policy placed emphasis on the provision of fast anti-submarine vessels because the most probable form of naval attack was by submarine.

The Australian Minister for Defence, Sir Philip McBride, told the House of Representatives this on October 22 when speaking on the Defence Estimates.

He said the Navy this year would have in commission two aircraft carriers, one modern class ship, three destroyers, six frigates, four ocean minesweepers, and various other smaller vessels.

He said the Sea Venom jet fighters and Gannet turbo-prop anti-submarine aircraft had all been obtained for the Fleet Air Arm.

Since June, 1950, 215 aircraft had been delivered to the Fleet Air Arm.

The construction of two Darwin class ships was being accelerated. It was expected one would be completed at the end of 1958 and the other in the middle of 1959.

Construction of four new anti-submarine frigates was also being accelerated, Sir Philip said. Sir Philip said the commissioned vessels were supported by a ready store of destroyers, frigates, and other vessels which were being maintained in accordance with a carefully planned programme of priority.

Shore establishments would be streamlined and the activities of training establishments co-ordinated and, where possible, amalgamated to keep down overhead costs.

Guided missiles were on public exhibition at Britain's Farmborough Air Show recently. This picture shows, in the foreground, the Bloodhound surface-to-air missile, on the left the Australian Australis pilotless, radio-controlled target aircraft; and in the background the Thunderbolt surface-to-air missile.
Who will build the first big A-power ship?

BRITAIN'S brightest brains, and some of her finest craftsmen, are lining up for a heavyweight contest with a difference.

It will be a real battle of giants, with four of the most famous firms in the United Kingdom sorting themselves into two camps to slug it out.

At stake: The prestige, the worth of which cannot be assessed in mere money, of being the designers and builders of the world's first really big atomic-powered ship.

Here is the lineup.

In one corner: John Brown & Company Ltd., of Clydebank, builders of Britain's Queen Mary II, and well known to the world of atomic shipping.

In the other corner: the Cammell Laird & Company Ltd., of Merseyside, builders of some of the most famous warships of the Royal Navy.

Teaming up with them:

The Babcock & Wilcox Group Ltd., builders of Britain's four-jet Vulcan bombers, makers of guided weapons, and developers of revolutionary new aircraft.

The Cammell Laird-Babcock & Wilcox team are known to favour using atom engines that are a scaled-down version of the Calder Hall graphite-moderated gas-cooled reactors — of which they have first-hand knowledge.

The John Brown-Hawker Siddeley team are skilful at their entrant in the propulsion stakes.

But some scientists hint that they may lack the organic moderated reactor — in which certain petroleum oil compounds, the polynuclears, which stand up well to radiation bombardment, are used.

On the shipbuilding side, there is little to choose between the rivals.

John Brown have the advantage of having built the biggest ships. The Queen Mary II (8,237 tons) and Queen Elizabeth (85,673 tons) are floating testimonials to their brilliant know-how.

But though this argument goes down well in pubs like the Seven Seas, outside the John Brown main gates in Clydebank, Glasgow-road, it is not an argument to use in the Merseyside pubs, where the Cammell Laird men drink.

There, the talk is of ships like the two Ark Royals — the one that Dr. Goebel's sank half a dozen times, and its近恤fee, now the pride of the Royal Navy's carrier fleet — the battle ships Roden and Prince of Wales, and the 5,000-ton Mauretanian, all Cammell Laird-built.

On the scientific side, too, both teams are well matched. Babcock & Wilcox have unrivalled experience in the design and construction of land-based atom power units — and there will not be much difference in the sea-going units as far as operation and design are concerned.

Masterminding the Hawk team is two men of differing personalities, both of whom are outstanding.

One is Sir Arnold Hall, Hawker Siddeley's 42-years-old Liverpool-born technical director and former head of Britain's Royal Aircraft Establishment.

The other is Sir Roy Dobson, aged 65, the man who will put the Hawker viewpoint at John Brown-Hawker conferences.

One thing is certain. No matter which team loses out in the big Atomic Race, Britain will ensure that the Red Duster, and not a foreign flag, will fly at the stern of the world's first economic atom-powered merchant ships.

By RONALD BEDFORD
Science Reporter of the London "Daily Mirror"

The trend is to Super-tankers

By D. M. PILCHER, Director, Petroleum Information Bureau (Aust.).

OVER the next 20 years, world demand for oil is expected to double.

This presents a challenge to international shipbuilders. They are racing to produce giant 100,000-ton tankers which will carry the petroleum cargoes of tomorrow.

Ships already on the stocks would have been considered laughable only a few years ago. The tremendous development of the oil industry and the uses for new petroleum products created through advances in refining techniques, have caused an astounding growth in the world tanker fleet.

The fleet at present comprises 2,865 vessels. Of these, super-tankers in service aggregate 50,697,206 tons and on order 25,569,200 tons.

This trend for bigger tankers is emphasised by the fact that the large total of 960 tankers under construction, nearly 80 per cent. of the total tonnage are in super-tanker class.

On a given day, 12 million tons of petroleum products valued at approximately £110 million, are being shipped across the high seas by this ever-increasing armada.

Tanker tonnage now represents about 27 per cent. of the world merchant fleet. This compares with 19.6 per cent. in 1939.

The reason for the rapid growth in size of oil tankers is the great increase in world demand for oil and the change in the pattern of world oil trade.

This has followed the post-war policy of locating new oil refineries in consuming countries rather than near oilfields.

Before the war, five-fifths of transported oil consisted of refined products and only one-fifth was crude oil. To-day, these proportions have been reversed.

The change is particularly noticeable in Australia, where oil refining capacity increased from less than one million tons in 1951 to more than nine million tons in 1956. This was made possible by the establishment of a chain of four new refineries in the last six years at strategic points on the Australian coastline.

Australia's refineries are now processing 80 per cent. of the nation's needs. Eighty-five per cent. of motor spirit used in Australia is refined here and production of aviation gasoline is now approaching 50 per cent. of the needs of the market.

Australia is self-sufficient in capacity to refine its requirements of distillate, diesel and jet fuel.
fuel oils, and there is, in addition, a surplus of those products for industrial use. The future expansion of the oil refining industry in this country will largely depend on the encouragement given by the way of the tariff. Overseas oil groups have spent heavily in the last six years in making Australia almost self-sufficient in refining capacity, but companies are unlikely to invest any further capital in this field unless they are reasonably assured of an adequate return on this investment. Despite a vigorous search for oil in Australia, there have been no finds in commercial quantities and the country has therefore to rely on tankers to bring in its requirements of crude from overseas fields.

**Australia's imports**

With the community spread over a vast area of 5 million square miles, the dependence on communication by oil is high. Last year Australia imported petroleum products valued at £88,500,000 — 78 per cent, of which consisted of crude oil only. To meet the increasing demand for oil, both in Australia and throughout the world, oil companies and independent tanker owners have been ordering bigger vessels over the past five years. But until recently many owners did not plan to operate ships which were too big to pass fully loaded through the Suez Canal. And because the Suez route halved the Middle East to Europe journey, a limit of 212.8 T-2 was set on oil-carrying vessels. Moreover, the minimum operating size of ships is still a relatively small tanker.

**The world tanker fleet**

The world tanker fleet is growing so fast that some observers foresee a heavy surplus by 1956. More than 43,000 vessels are on order, at least six million more planned — with emphasis on big size. However, owners ordering new ships will still be required to give catering for the needs of an oil-thirsty world.

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*Excluding U.S. Government tonnage.*

**Few Government-owned**

Further, the transfer of some ships to Liberia, Panama and other oil-thirsty countries has steadily increased, to give the Governments a tool of taxation and political or strategic advantage. The practice of sailing under foreign flags has become more prevalent in recent years when shipowners realized that little taxation relief was forthcoming to the shipping industry.

**Flags of convenience**

Account, however, must be taken of the long-established practice of some shipowners to 'flag' the vessels they own under the flags of foreign countries, a practice which offers advantages in taxation, in savings on wages of crews and in economic benefits of other kinds. In terms of ownership of existing tanker tonnage, the United States is preponderantly the U.S. owner, but the United Kingdom, Japan and Liberia provide another interesting statistic, which may well be the world's largest by about 1960. The striking changes which have occurred in tanker design since the war, notably the registration of many U.S.-owned tankers under the flags of Liberia and Panama, may be traced in the table on this page.

The total tanker registered under accommodation addresses in Liberia, Panama, and Costa Rica has reached a total of some 10,400,000 tons, which compares with only 750,000 tons in 1959.

The total size of tankers sailing under foreign flags has become more prevalent in recent years when shipowners realized that little taxation relief was forthcoming to the shipping industry.

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**Flags of convenience**

Account, however, must be taken of the long-established practice of some shipowners to 'flag' the vessels they own under the flags of foreign countries, a practice which offers advantages in taxation, in savings on wages of crews and in economic benefits of other kinds. In terms of ownership of existing tanker tonnage, the United States is preponderantly the U.S. owner, but the United Kingdom, Japan and Liberia provide another interesting statistic, which may well be the world's largest by about 1960. The striking changes which have occurred in tanker design since the war, notably the registration of many U.S.-owned tankers under the flags of Liberia and Panama, may be traced in the table on this page.

The total tanker registered under accommodation addresses in Liberia, Panama, and Costa Rica has reached a total of some 10,400,000 tons, which compares with only 750,000 tons in 1959.

The total size of tankers sailing under foreign flags has become more prevalent in recent years when shipowners realized that little taxation relief was forthcoming to the shipping industry.
NEW P. & O. COMMODORE

THE P. & O. S.N. Company has announced the appointment of Captain C. E. Pollitt, who commands the 29,600-ton Ithira, as Commodore of the P. & O. fleet of 35 passenger and cargo liners and troopships.

Captain Pollitt's appointment took effect on October 11.

The retirement as Commodore of Captain E. R. Bodley, D.S.O., was announced a few days earlier.

Captain Bodley was in command of the 30,000-ton liner Arcadia when he retired.

The new P. & O. Commodore stood by the Ithira at the builders until her completion and has remained in command since she was delivered to the Company in September, 1954.

Born in 1897, Captain Pollitt began his career in the Merchant Navy training ship H.M.S. Worcester, joined the Royal Naval Reserve as a midshipman during World War I and saw his first service in H.M.S. Dreadnought.

He has been with the P. & O. Company, which he joined as fourth officer, since 1919.

From 1937 to 1941 he was first and then chief officer of the Strathaird, which did duty as a troopship during the war.

Early in 1915 he took command of the Empire Byng, a ship in the "fleet train" which carried railway engines, tugs and barges to take part in the Malaya campaign.

After the war he commanded the Puringa on a voyage to Australia, then commanded the cargo liner Shillong and the passenger liners Mooltan, Strathaird and Strathmore.

Captain R. J. S. Paice, from the Chusan, has succeeded Captain Bodley in command of the Arcadia.

German Raider

The Battleship Scheer," by Admiral Theodor Krakke and H. J. Brennecke (Kimber). This is the story of the Admiral Scheer and her achievements in sinking merchant ships and running away from possible antagonists.

It is written by her Captain and a German naval author, and gives an interesting account of her breakthrough into the Northern Atlantic, and operations in the South Atlantic and Indian Ocean during which she sank 152,000 tons of Allied shipping.

Her attacks against convoys — especially that so gallantly defended by Captain Fegan, V.C. in the Jervis Bay — make grisly reading.

Tramp sinking by the auxiliary cruisers was one thing: tailing a big convoy and shooting-up tankers with 3.9-in. and 11-in. guns one after the other, leaving a trail of burning, sinking ships until it was time to turn tail and get away from possible trouble was a very different sort of job which could only carry kudos in German eyes.

But having been built for such employment, ordered to avoid action with enemy warships, and using every trick to get within range of her quarry without exposure to risk, the Admiral Scheer carried out her duties as bait in the "fleet train" which made identification confusing, and the elevating of the outer 11-in., with the middle one depressed was intended to give the impression of a "Beut" class cruiser — disregarding the absence of the second superfiring turret.

The "Lucky Scheer" met her end when she was dismantled for an overhaul at Kiel, and sunk by our bombers.

— O.P. (in the London "Navy").

The Red Duster


This book, as its title implies, adds one more to the stories we can never tire of reading them — of the splendid work of the officers and men of the Merchant Navy in World War II.

Called up from retirement, the author, Rear-Admiral Creighton, spent the first three years of the war almost continuously at sea as Commodore of Convoy, mostly on the North Atlantic route but also in troop convoys to Suez via the Cape.

Among the many exciting incidents described are the author's personal experiences when his own ships were sunk — the first by a submarine and the second by a bomber.

But the chief interest and value of the book lies in his account of his relations with the masters and officers of the merchant ships in which he sailed as Commodore.

Some of them were relatively small freighters sailing backwards and forwards across the Atlantic bringing essential supplies.

Admiral Creighton emphasises three valuable lessons — the value of convoys, the much greater safety given by higher speed and the futility of zig-zagging if ships are proceeding at less than 12 knots.

His book is well illustrated with an excellent map of the area inside the front and back covers.

— G.P.T. (in the London "Navy").

CIVIL WAR ADMIRALS

"Mr. Lincoln's Admirals," by Clarence Edward Macartney (The Mayflower Publishing Co.).

There has been little enough published about the American admirals who conducted operations at sea during the American Civil War. Most British students of naval history will, of course, know of Porter and Farragut. Some will recognise the names of Dahlgren and Worden. But of the others little is known.

There is a chance now to make good this gap in our knowledge, for Mr. Macartney's book introduces them all to us.

For some reason the land campaign in the Civil War is far better known and far more widely studied than that fought out on the sea.

Yet, as the author shows, there was much that happened at sea which is very well worth the attention of the naval student.

— K.P. (in the London "Navy").
RUSSIAN NAVAL MOVES IN MEDITERRANEAN

From a London Correspondent

Recent events tend to show that Russia is beginning to assert herself as a major naval power. The significance of her post-war building programme is being underlined by events.

Latest in the large number of movements of her warships was the passage through the English Channel of the 15,500-ton "Sverdlov" class cruiser, "Zhdanov", and the 2,200-ton destroyer "Nobodni", bound for the Mediterranean.

Russia's main strength in the Mediterranean is in submarines, mostly at Albanian ports. Submarine pens are reported to have been built in the island of Skar opposite the port of Valona, where the Nazis based many U-boats during the war. Valona itself has been re-established as a submarine base by the Russians.

The ship is valued at £1 million and has £50,000 worth of arms on board in addition to its hoard of gold.

A Japanese firm, the Nippon Salvage Co. Ltd., will send men and equipment to Queensland for the job.

The ship was carrying wheat, barley and tallow for Japan.

The tanker was the France-bound warship, "Sazan", opposite the port of Valona, where the Nazis based their own. Commander of the U.S. marines at Dherm, Durras (Durres) (Durras) (Durres), and Shengjin, which may also be used by Russia.

It is difficult to estimate how threatening this is to the Mediterranean's submersibles. There are also bases for submarines at Dherm, Durras (Durres) and Shengjin, which may likewise be used by the Russians.

Court Order on Motor Vessel

In a reserve judgment in the Darwin Supreme Court on October 3, Judge Kriewaldt ordered that the 750-ton motor vessel Rose Pearl be sold and £15,585 of the proceeds be paid to Dalgety & Co. Limited.

Mr. Townley said arrangements had been made for a four-year charter of two foreign ships — the Fairsea and the Castlet Forte — to provide a high standard of accommodation.

The newly-converted Castlet Forte would replace the ship Forte — to provide a high standard of accommodation for the job.

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Continuing...

NAVIGATING BY RADAR

From page 13

one. There was thus no means of telling in which direction a ship was moving except by making a plot of a number of consecutive positions of echoes on the screen. The last paragraph has been written in a similar sense, as current design is looking towards further improvements, but in fact it is applicable to almost every radar set at sea to-day. If we compare what a navigating officer can see with his eyes and what he can tell from looking at his radar screen, we find that each has its advantages.

Radar versus visual

Through the bridge windows he can see whether the object is a ship, and can tell which way it is heading (fairly accurately), how fast it is going and how far off it is (not so accurately).

He will also notice any change of course by the ship as soon as it starts to turn.

On the radar set he can measure once and with accuracy how far off the ship is, he can tell which way it is heading, and how fast it is going more accurately than he can by eye, as long as he has time to follow the echo for a little and plot successive positions, but it may take him some minutes to see that an approaching ship has changed course.

This comparison shows that, providing that time is available to assess the situation, today's radar can claim to give more accurate information than can be had by looking out of the bridge windows.

There must not be too many ships about, and those that are there must be a good way off. In crowded waters, and with other ships nearby, radar is at best a poor second. In practice the comparison is further unbalanced by virtue of the novelty of radar.

Senior officers at sea-to-day have spent a lifetime on the bridge, and their reaction to an awkward situation in clear weather is almost instinctive, and therefore instantaneous.

When using radar this is no longer so, and the business of translating the plan shown on the radar screen into the familiar mental image of what is happening creates one more stage in the process of making a decision where an error of appreciation or judgment can lead to disaster.

In the vast majority of cases, radar is successfully used to save a ship's time in log, and collisions are avoided.

However, there have been sufficient collisions between ships navigating by radar to cause a certain amount of concern, a notable example being that between the transatlantic passenger liners Andrea Doria and Stockholm in New York last year.

Radar designers are now working hard to improve radar sets still further, mainly in the direction of making the information that they provide available to the user at a glance.

One important development by a British firm, Decca, is what is known as true motion radar. This is important because moving echoes on a radar screen appear to have a trail behind them, actually formed by the dying away of previous echoes.

On a true motion set these trails coincide with the wakes of the actual ships, and therefore show at a glance the direction in which a ship is heading, and any change of course.

Appreciation of what is happening is thus much quicker than with the normal type of set. True motion sets are now being produced by other manufacturers as well, and represent a very definite advance.

Progress is still being made in the technical field, too. A recent advance by another British firm, Kelvin & Hughes, is a new type of aerial which offers better performance for less weight and wind resistance.

The set in which this aerial is used also breaks new ground in marine radar with the use of what are called printed circuits, recent development in radio technique.

In the future

After this, we come to the future. The next advance is likely to be towards sets using an even higher frequency. This will allow the shape of ships to be seen, and this is much more important than with the normal type of set.

It might in time be possible to produce a radar set that gives a photographic picture of what can be seen from the bridge windows, resembling the picture of a television set.

Modern radar and television techniques make almost anything theoretically possible to-day.

It is mainly a question of balancing the advantages of new developments against their cost.

FIREFIGHTERS SHOW HOW IT'S DONE

Navy Week was observed in Sydney from October 12 to 19. Pictured here are trainees of the Navy Damage Control School extinguishing an oil fire as part of the many demonstrations which the Navy staged at Garden Island when it was open for public inspection on October 12. About 40,000 people visited the island. They saw helicopter displays, watched the submarine Aurora dive in Captain Cook Dock, saw H.M.A.S. Warramunga fire torpedoes and Squid anti-submarine weapon, went on board the carriers Sydney and Melbourne and aed at a replica of Sputnik, the Russian earth satellite.

THIRD OF FISH CATCH IS FROM NORTH PACIFIC

About 20,000 million lb. of fish, one-third of the world's supply, is taken in the North Pacific Ocean. Roy L. Jackson, Director of the International North Pacific Fisheries Commission, told a meeting of Canadian fisheries officers at Vancouver, Japan takes 8,000 million lb. and U.S.A. 1,000 million.
FLEET TRAIN'S BIG JOB

The U.K. Government's decision to base the main elements of the Royal Navy on a limited number of highly mobile aircraft carrier task groups considerably increases the importance of the Royal Fleet Auxiliary Service.

It is imperative that the Navy should become more mobile and less dependent on highly organised shore bases for two reasons: first, because bases would be extremely vulnerable in a global war fought with nuclear weapons; and secondly, because the demand for selfgovernment by many countries throughout the world is continually compelling the United Kingdom to lessen its grip on many overseas bases.

In the past, overseas bases have been the cornerstones of British strategy, but, in a world in which they might be utilised by nuclear bombardment from extreme range, their importance becomes less and the Navy's ability to move about without being tethered to bases by a short rein becomes more important.

Ships must always be docked for repair, supply and refitting, but a comparative state of independence can be achieved if means of supply, maintenance and servicing are available at sea or in some pre-selected harbour or anchorage.

They must have what is now described as "afloat support," or what has been more generally known as a Fleet Train. In other words, routine port facilities must become mobile.

This is not a new problem. It has been practised in wartime and peacetime, but never as a deliberate policy to eliminate the need for fixed base facilities as far as possible.

For a decade the United States Navy has now operated a system of afloat support for its Sixth Fleet in the Mediterranean but the Americans have no bases of their own in that part of the world.

The Royal Navy still has valuable base facilities within reasonable distance of any of its ships, but it proposes to do without them as much as possible.

By DONALD BARRY in London

This is the crux of the new defence policy as it affects the Navy.

Afloat support was the key to Naval warfare in the Pacific during World War II.

The factors involved in fighting a naval war in such a large ocean compelled the United States Navy to develop its logistic supply and support system to an extent never previously contemplated.

Then, later, the Royal Navy had to adopt the new pattern of waging war at sea.

But, unlike the U.S. Navy, who had had time to acquire a series of temporary bases (in some cases they were merely stopovers) across the Pacific U.S. forces, when they pushed towards Japan, the Royal Navy, when its main strength was transferred from the European theatre of war to the Pacific, had to operate immediately in regions 5,000 to 10,000 miles from its main bases.

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responsible for refuelling the Royal Yacht between Australia and St. Helena.

It is on such ships as these that the brunt of supporting the Navy in the distant parts of the world rests.

In war, merchant ships can be converted for service within a fleet train, but in peacetime "afloat support" is almost entirely the responsibility of the Blue Ensign Auxiliary Fleet, comprising tankers, store issuing ships, tugs, salvage vessels, etc., manned by a body of Merchant Navy officers and seamen who, in the main, are engaged on normal Board of Trade articles. Nevertheless, they are in a very real sense part of the Royal Navy.

Peacetime Fleet support is normally well within the capacity of the Royal Fleet Auxiliary Service.

Some of its tanker tonnage is, in fact, chartered by the Admiralty to commercial companies and some store issuing ships not required for the close support of the Fleet are employed in transporting Naval stores and equipment throughout the world.

The decision that in the future naval facilities will be provided to meet the needs of the Royal Fleet Auxiliary rather than the Royal Navy is a signal indication of the changing nature of the Navy's role in the world today. In this respect, it is significant that the First Lord of the Admiralty has indicated that steps are to be taken to modernize the ships of the R.F.A., and as a first step, three are to be taken in hand this year.

The light fleet carrier Triumph is also to be converted for service as a heavy repair ship under the White Ensign.

In a world in which bases could be obliterated at one stroke, the logical conclusion is that ships must become more self-sufficient and capable of looking after themselves on the high seas.

This is a big and complex logistic task, but one well within Britain's capacity.

Nuclear propulsion may eventually ease the problem by reducing the requirement for oil fuel, but whatever the future may hold, ships of the Royal Fleet Auxiliary, which have played a vital role in two world wars, and all vessels which can support fighting units in distant waters will become immeasurably more important than they have been in the past.

(From the London Navy)

**HE WON THE DIAMOND SCULLS**

_Australian sculler Stuart Mackenzie, of Sydney Rowing Club, photographed getting ready for a practice run. In England recently he won the Henley Diamond Sculls, one of the classics of the rowing world._

**BERTHS FOR BIG SHIPS**

In the U.K., berths for ships up to 100,000 deadweight tons are to be provided at Milford Haven, for ships up to 65,000 tons at Southampton and up to 100,000 tons on the Clyde.

On the Mersey, a new oil berth is contemplated for vessels up to 65,000 tons or up to 100,000 tons subject to a draught restriction.

*Friends and relatives of the ship's company farewelled H.M. Submarine Thorough when she left Balmoral, Sydney, for Britain on October 8. The submarine had served in Australian waters for eight years.*
MAKING THE SEA A SAFER PLACE

By JOHN CAMPBELL

STORM, stranding and fire have been sea hazards through the centuries, taking a heavy toll of the lives of seamen and of their passengers. With the coming of the steam engine and the great increase in travel which followed during the latter part of the nineteenth century, this toll increased sharply; and the stories of early passenger liners in particular are dotted with the names of ships lost with all hands, or with heavy loss of life.

The Load Line — the Plimsoll Line after its great advocate, Mr. Samuel Plimsoll — came in 1875 as the first major measure to improve safety at sea; and increasing effort have been directed to this end ever since.

Board of Trade Regulations have been progressively stiffened as one tragedy or another drew attention to a particular need. As an outstanding example, when the Titanic sailed in 1912, one of the features of the ship was thought to be the lavish provision of lifeboats. Yet they proved tragically inadequate in the disaster which followed; and in the outcome the requirements were revised to improve arrangements, both for provision of boats and for practice in their use.

Another development has been the tremendous development of wireless, still in its infancy in 1912. Yet wireless has still be supplemented by rockets and flares; and the Schermeulin Company, who celebrate their Diamond Jubilee this year, are still among those firms who supply this type of gear, which is particularly necessary in aid of lifeboats and liferafts to make their presence known to rescuers.

The First World War perhaps underlined needs rather than remedies, though technical advance continued steadily. The development of the internal combustion engine brought the motor lifeboat, with many advantages but equally with certain limitations.

The memorable voyage of the survivors of the Trevessa in 1925 was made under sail; for clearly the motor lifeboat cannot carry fuel for an extended voyage. Indeed, if help is anywhere near, to move far from the scene of a disaster may prove a worse tragedy, since a small boat is very difficult to find, as many survivors can testify. The motor-boat's best service has often proved to lie in keeping other boats and rafts together until help has arrived. This Second World War again brought out the needs where safety at sea was concerned. In some respects technical research facilities were better equipped to meet them. To take a well-known instance, it was electrical development which made possible the small light attached to rafts by which many men owed their lives. When the losses came to be analysed at the end of the war, however, it was found that a horrifying proportion of deaths were due to exposure while in boats. Further, in too many cases there was either no time to get boats away, or a list made it impossible to launch from one side of the ship.

When these facts became apparent the Admiralty undertook extensive tests of life-saving equipment. Carter floats used in H.M. Ships had proved very successful. Further, between the wars Mr. R. F. Dagnall, an aircraft designer, had developed for the R.A.F. an inflatable rubber dinghy which had saved the lives of many ditched airmen.

Working on these lines, the Elliot Equipment Company designed for the Admiralty a 20-man inflatable liferaft, with a canopy for protection against exposure, which is now standard equipment in H.M. Ships.

In October, 1956, this type of equipment was made compulsory in British fishing vessels, the decision being largely influenced, no doubt, by the fact that in that year 57 fishing boats were reckoned to owe their lives to these rafts, which functioned safely when ordinary lifeboats could not be used.

Similar rafts are now approved by the Ministry of Transport for use in British passenger ships, and consideration is being given to making them compulsory. The position here is complicated by international agreements which supplement and strengthen national regulations.

The International Committee on Safety at Sea meeting, in 1918, forbade the use of lifesaving equipment inflated by gas or air; but it has been suggested recently that another conference should now be called to reconsider this question in the light of current developments. The point is underlined by recent tests which show that the standard kapok-filled lifejacket loses its buoyancy in air, while inflatable lifejackets remain unaffected.

Experiment goes on steadily to improve the rafts. Mr. Dagnall's company — The R.F.D. Co. Ltd. — sticks to the round shape of the R.A.F. dinghy. Most other makers use an oval shape. Elliott rafts have a light on the canopy to make them more easily found. Beaufort Air-Sea Equipment have been experimenting with daylight fluorescent pigments for the canopy, with very satisfactory results.

As a further aid, experiments are now being made at Ultra Electrics SARAH (Search And Rescue And Homing) equipment for use in liferafts and rafts. As in the past, survivors must depend on some form of light signal, and much research has gone into the development of this type of equipment. The latest types are of aluminium and are lighter and stronger than hitherto. New types of release gear and davits have been developed, such as those designed by Welin-McLaughlin for the Orient Line's Orio, recently ordered.

Air-cooled dirigibles, developed by Petters and McLaren, have the great advantage that they can be started before the boat is in the water, so that on launching they move away at once from the ship's side, thus greatly reducing the risk of accidents.

The fact still remains that in too many instances lack of time, or a list, precludes the launching of lifeboats. This was the case in the Andrea Doria-Stockholm collision just under a year ago.

Yet it is also true that the lift-raft has no means of propulsion but drifts at the mercy of winds and currents; and it is also admittedly difficult to locate. A recent case of men drifted for 60 hours before being picked up, though reports are correct, they were apparently only some 20 miles from shore.

It was truly said 2,000 years ago that there is no one road that leads to Rome. Safety at sea, if it can ever be attained completely, may well lie in some combination of boat and raft, and in the application to technical advance of all the knowledge and ingenuity with which man is endowed.

(The London "Navy")
There are 217 lighthouses, auxiliary lights, lighthouses, buoys and beacons under Commonwealth control on the Australian coast. Of these, the majority are automatic, requiring only periodic servicing, but 67 lighthouses and auxiliary lights are manned.

In addition, in 1918 the Commonwealth assumed control of about 30 lights and 30 unlighted beacons on the coastline of Papua and New Guinea.

Types of lighthouses on the Australian coast vary considerably, each being designed to meet particular local requirements.

The most important lights are established at prominent landmarks or near turning points on important shipping lanes such as Cape Leeuwin, in the south-west of Australia, Cape Renda on Kangaroo Island, South Australia, and Cabor Island in Victoria; or near important shipping centres, for example, Macquarie near the entrance to Sydney Harbour, Nobbys Head at the port of Newcastle and Cape Moreton on Moreton Island, near the entrance to the Brisbane River.

First lighthouse

The first Australian lighthouse was opened at South Head, Port Jackson in 1817, originally burning whale oil.

Present day lights are usually manned by two or three lightkeepers, who live on the stations with their families. Their important duty is to make sure the lights are operating.

Lighthouse apparatus is installed in lanterns of metal and glass placed on towers of concrete, steel or stone. Powerful light beams of up to 3,000,000 candlepower are produced by the magnification through revolving lenses, of either a powerful electric lamp or an incandescent mantle in which a mixture of air and kerosene vapour is burnt.

Lighthouses in some areas, especially the northeast, are built to withstand gales of 130 miles an hour.

They are spaced at frequent but varying intervals, averaging about 20 miles. Generally, lights are spaced at longer intervals.

Lightkeepers live a lonely life. However, they usually live in comfortable homes built near the tower. They are given 28 days' recreation leave yearly, exclusive of Sundays and travel time to and from the lighthouse house.

They play an invaluable part in helping to keep our seaways free of tragedy.

Most northerly of the Commonwealth's lighthouses is at Cape Don, 100 miles northeast of Darwin; the most southerly is on Maatsuyker Island, a rocky outcrop off the lower tip of Tasmania.

Most easterly-located is on a dangerous cliff which drops almost vertically 300 feet to the sea on Cape Byron near Umina, and the most westerly is at Cape Inscription on Dirk Harrog Island, South West of Carnarvon.

The most brilliant light on our coasts is the 3,000,000 candlepower one on Rottnest Island.

The light-station on Tasman Island near Port Arthur in Tasmania, rises abruptly from the sea to 900 feet. It is one of a number of lights which has to be serviced by the use of a spectacular flying fox, while amphibious ducks equip several lights on the coasts of Queensland, Northern Tasmania and South Australia.

Saved many lives

No figures can truly assess the value of service given alike to the ocean liner and fishing smack on our long coast line. But it can be safely said that aids provided by the Commonwealth Lighthouse Service have saved many lives over the years in our more dangerous sea lanes. With advanced techniques in navigational aids, it is not unlikely that some of the lights, lightships, buoys or beacons will be replaced by more scientific equipment such as radar reflector beacons.

Should that occur the seafarers who ply our sea tracks will no doubt adapt the change. But in the manner of mariners the world over they will retain affectionate memories of the light that has served their safety so well.

[From: "The Accelerator"]

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THE STATE OF THE S.C. CORPS

PREOCCUPATION with highly necessary building programme and a scarcity of instructors have caused a drop in the strength of many sea cadet units in N.S.W.

When the Director of Naval Reserves made his inspection of units a few months ago the situation briefly was this:
T.S. Tobruk (Newcastle): Strength 47. Short of instructors. The unit has a whaler and a 14-ft. sailing dinghy.
T.S. Condamine (Manly): The unit has 35 cadets in cramped quarters, with little room for expansion. It has a whaler, but gets the loan of a whaler from H.M.A.S. Penguin occasionally.
T.S. Australia (Waverton): Strength 45 cadets. For the past three years the unit has been allowed the use of Boom Depot, Waverton. With the reduction of the depot and the shortage of equipment, space has become restricted.
T.S. Warrego (Woolwich): Strength 15 cadets. A committee raised several hundred pounds, which was spent extending the small drill hall. The unit has its own whaler.
T.S. Sydney (Snapper Island): Strength 33 cadets. It has facilities for training, is ideal for week-end camps, and has ample boats.
T.S. Shropshire (Canterbury): Strength 51—the highest in N.S.W. A great deal of work has been done with voluntary labour in building and improvements. The unit is short of officers.
T.S. Sirius (Arncliffe): Strength 12 cadets. It has bought with its own funds three huts from Disposals and is erecting them on two acres of land given by Rockdale Council.
T.S. Albatross (Wollongong): A local committee recently raised enough money, with financial help from the Navy League and the Navy, to build a £5,000 training headquarters.

The whole picture shows a struggle for funds, and a struggle to get equipment and competent instructors, without which recruitment is well nigh impossible.

This is a job not only for the existing units and the Navy League, but for all citizens.
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Dec. 1557

THE NAVY
"MONTY," SAYS SEA POWER WILL BE DECISIVE

In a recent talk to the Navy League in London, Field-Marshal Viscount Montgomery said: "It is obvious that, in future war, sea power will be a decisive factor."

The following are the main points of the Field-Marshal's address:

The day when an army can be fed only by land and air, will be long past. In recent years there has been a school of thought which considered that there will be no role for the British Navy in future war. Never was there a greater error.

Where are the facts? First, we are an island people. We fight our wars in other people's countries — France, the Low Countries, Germany, the Americas, the Crimean, Africa, India, the Pacific, and so on.

We prefer it that way. It is inconvenient when you have to fight in your own country. The Army must be taken to those places by sea, and nourished by sea. When it fights it generally has one flank on the sea — as we had in North Africa and in North-west Europe.

It must be taken to those places by sea, and nourished by sea. When it fights it generally has one flank on the sea — as we had in North Africa and in North-west Europe. Its supplies must come by sea.

The day when an army can be supplied entirely by air is still many years away. Then there is another point — one which is vital to the nations of Western Europe. Western Europe — including the United Kingdom — is the heart of a world-wide economic system. In that system there are no large supplies of raw materials, except possibly coal.

Large imports of food are necessary to feed the populations. But the overseas sources of raw materials, particularly oil, and the sources of food supplies and the transit areas through which they must come, are all subject to pressure and to threats of a "cold war" nature.

They must be protected, together with the bases and sea communications from which they are controlled.

Failure to protect them would lead to the collapse of the whole economic system, and ultimately to the loss of Free Europe to international Communism.

Russia will strive for success in this direction, the indirect attack, rather than by direct aggression against the NATO front in Europe — since the indirect method is far less costly and is far more likely to succeed.

One fact: Three-quarters of the surface of the world is water.

It is clear from what I have just said that the Western Alliance must have the free use of the water areas in peace and in war.

The teaching of history is that from the days of early Rome the nation which had control of the transit areas and seas in the end prevailed.

Those are the facts. We cannot change facts. We must base our policy and action on them. Whichever way you look at it, the Western Alliance must be able to use the major oceans and seas.

Today, control of the seas is a matter for ships and aircraft — all operating under naval direction and control.

To carry out this task efficiently, the Navy must have its own aviation. Furthermore, the aircraft carrier of the Navy is the indispensable mobile airfield of modern armed forces.

These mobile airfields are greatly valued by the Army.

As an example, take the Navy operations in November last year, in those operations the bulk of the air support for the Army came from naval aircraft operating from carriers.

And in the future air support from mobile airfields on the sea may often be the only support the Army will get in the early stages of those operations which are carried out at a distance from the normal airfield complex.

There is therefore an Army need for the naval aircraft carrier, and a need about which we soldiers feel keenly.

The Navy League exists to remind the people of this country and the Commonwealth of all these things, and of our maritime traditions.

Let me give you an example of how naval tradition is upheld.

During the operation in Crete in the late war, a dangerous and difficult evacuation became necessary.

The carrier operating from Crete in the late war, a dangerous and difficult evacuation became necessary.

There was a view that to hazard ships in those parts would involve far too great a risk — that they were at the moment more valuable than the very few fighter pilots.

The Admiral of the Fleet, Sir Andrew Cunningham, said very quietly that the Navy had always been accustomed to take the Army to its destination, and bring it home afterwards. It
It took only a few years to replace any ships that might get sunk, but a lost tradition would take centuries to replace. The Navy, therefore, would go and evacuate the troops if they so desired. But he added, they refused to be evacuated, then the Navy would come and take off the Marines.

There is another form of tradition that is peculiar perhaps to the Royal Navy.

Down the centuries, ordinary men, many of whom may never have seen the sea in their lives, have come forward from the plough or the anvil, or in later years the factories, to serve in our ships. They have come in their thousands.

They do not belong to the R.N.A.S. or the R.N.R. nor to the season, or any user. They are the people of Britain, a complete cross section of the country.

In the past we have had time to train these men so that they have become professionals. Will there be time to do so in the future? I doubt it.

That is why it is so important to get men into the voluntary organisations now — today. Here the Navy League helps, and this task will remain in the future.

Against this general background it is obvious that in future war, sea power will be a decisive factor. And by sea power I mean ships and naval aircraft operating from carriers, since the one without the other is useless.

I was delighted to read in the Press that when the Minister for Defence returned from a trip in U.S. nuclear-powered submarine Nautilus, he said that the nuclear submarine represented a revolutionary advance in naval warfare as great as the change from sail to steam.

He was right.

And I remember that when the Naval Estimates were being debated in Parliament it was stated that we were building a nuclear submarine.

That was right, too.

A revolution in naval warfare is definitely coming, brought about by nuclear power.

It is heartening to learn that the British Government is fully alerted to this fact.

The Navy must turn over quickly to nuclear power; in due course the Merchant Navy will do the same, and with far less constructional cost than at present.

The merchant ship of the future will travel under the sea.

The Japanese are already buying a 65,000-ton submarine for freight carrying use.

The navies of the Western Alliance must, collectively, ensure control of the major oceans and seas in any East-West contest.

It would be wise to emphasize the word "collectively." Those who want to see Britain strong in every component of her armed forces are inclined to forget that we belong to an alliance. From the point of view of overall efficiency for the least financial expenditure, we must plan to get the maximum value from the alliance — working for balanced collective forces within the alliance as a whole.

If each nation wants self-sufficiency in its armed forces, what value do we get from the alliance? Unless nations are sensible in this respect, and will trust each other, defence budgets will increase to an alarming degree.

Take, for example, the war at sea. In the present contest between East and West, there cannot be war in the Atlantic without war in the USSR, since the danger of aggression in the N.A.T.O. area is remote, because of what has been achieved in building up military strength in the Western Alliance.

In fact, the overall deterrent against general war, with nuclear weapons, is very strong.

The danger areas are now in the Middle East and Far East, more especially the former. We cannot be strong everywhere. We must balance the risks that have to be taken. We must tackle local and guerrilla type wars instantly — before they develop and spread.

It is a new Lester than to be common sense that the United States with her powerful fleets should be mainly responsible for war in the Atlantic, with Britain playing a part.

British sea power could then be deployed in strength in other oceans and seas, and to guard against approaches to our islands.

I look forward to the day when we shall see a strong British fleet, ships, and naval aircraft, operating in the major oceans and seas east of Suez, showing the flag and landing Royal Marines if necessary, backing up the Army in troublesome areas, and by such inter-service action dealing quickly with situations which, if not handled firmly at once, could develop into unpleasant conflagrations.

A study of our past history reveals that British strategy has always been based fundamentally on sea power. That is the right strategy, now linked to air power.

The late war was, in essence, a struggle for control of sea communications, and until we had won that struggle we were unable to proceed with our plans to win the war. It will be the same in future war.

If we reduce our Navy too much, the Army will have to add "swimming" to the many hard facts it has to perform at the start of our wars.
LOBSTER — OR CRAYFISH?

By FRANK McNEILL

(From an A.R.Y. talk)

NOW, firstly — this name “lobster.” I don’t think inquirers will ever tire of asking: “Are there any lobsters in Australian waters?” The same question crops up year after year.

At one time it sprang from arguments among those who had enjoyed a meal of our lucious sea foods. Today the same question has gained impetus from the great activity of spear fishermen.

It looks to me as if the names “lobster” and “crayfish” will never cease to be used indiscriminately by Australians. But it’s quite wrong to do so!

The French have a distinctive name — langoustes — for a Mediterranean and Eastern Atlantic relative of our marine crayfish. Their presence can cause some confusion.

The names of all our kinds of commercial prawns pass their eggs to float free in the water. Eventually they hatch there, and release the tiny larvae which look nothing like the parent.

Our Australian freshwater crayfish have a pair of big claws. In this they’re more like the true lobsters than crayfish. As a matter of fact, two giants of the freshwater family are occasionally, though incorrectly, referred to as “Murray River Lobster” and “Tasmanian Lobster.”

Now the question of prawns. There are few Australians who are not familiar with these kinds that are netted and sold in such quantities in all our capital cities. Some merely eat and enjoy these sea delicacies.

But there are many other prawns who find as well a natural history interest.

To them it’s a baffling mystery why, among the vast number of species there find no outward sign of breeding.

Prawns and shrimps generally carry clusters of eggs on the underside of the body. But the odd part is that just two families of prawns have the family to which the schooling kinds belong — differ from all the more numerous kinds in their breeding.

They never carry clusters of eggs on the underside.

Very occasionally you do find egg-laden prawns in the nets. Such finds have only been brought triumphantly to the museum as evidence of breeding.

But disfissivism soon follows when it’s pointed out that these are a different kind that have got into the net amongst the others.

The females of all our kinds of commercial prawns pass their eggs to float free in the water. Eventually they hatch there, and release the tiny larvae which look nothing like the parent.

It takes four or five castings to get these down.

He is a miracle of equipment, a living storehouse of the liquid wealth so vital to this age — that another dry hole can be tapped a storehouse of the liquid wealth so vital to this age — or that another dry hole can be tapped — and we are still far from the end of the trail of the oil-seeker.

The Adma Enterprise, out of Kiel Canal, Germany, was on the last stages of its 6,800mile tow to Das Island in the Persian Gulf, where it will be used to establish a deep test well for Abu Dhabi Marine Oper. Ltd., a subsidiary of the British Petroleum Co. Ltd.

The four 165ft. long retractable legs will be elevated by hydraulic jacks, and the ungainly vessel will have its 5,000-ton bulk 100ft. above the surface of the waves.

Early next year, the probing drill-bit will bite its way through the sedimentary ooze which has lain undisturbed on the ocean floor for millions of years, deep into the rocks below.

Time alone will show whether this effort will be a success. This storehouse of the liquid wealth so vital to this age — or that another dry hole can be tapped — and we are still far from the end of the trail of the oil-seeker.

From an A.R.Y. talk

THE NAVY

Dec 1977

OIL FROM THE SEA BED

HAWK-EYED masters of the Arab trading ships beating through the brassy flatness of the Persian Gulf have long gazed in disbelief at a strange craft which was slowly being towed through their waters.

The Adma Enterprise, out of Kiel Canal, Germany, was on the last stages of its 6,800-mile tow to Das Island in the Persian Gulf, where it will be used to establish a deep test well for Abu Dhabi Marine Oper. Ltd., a subsidiary of the British Petroleum Co. Ltd.

Time alone will show whether this effort will be a success. This storehouse of the liquid wealth so vital to this age — or that another dry hole can be tapped — and we are still far from the end of the trail of the oil-seeker.
Riding to Battle in a Helicopter

By Capt. T. M. P. Stevens, M.C., R.M.

A N A L Y S I S of the several methods of bringing an effective force to quick action in distant campaigns highlights the great advantages offered by having an airfield carrier equipped with a helicopter component. This would conveniently consist of 20 helicopters and a Royal Marine Commando of some 600 men.

The helicopter-borne force could strike quickly against enemy 50 or 100 miles inland without need for beaches or landing grounds. With its great mobility it could attack any part of the enemy it chose, destroying headquarters and communications, striking rapidly as the enemy reserves moved, destroying them piecemeal. The enemy might sometimes defend, but could not counter-attack because they could never move fast enough.

So far the British have only used helicopters in small numbers against guerrillas, in Malaya and Cyprus, but the French have used them extensively in Algeria. Experience shows that helicopters can give a small force a power out of all proportion to its size.

A light fleet carrier could be used, and could carry 20 helicopters and 600 men without major modification. The most suitable helicopter is the S.58, carrying 14 men at 100 knots. The original Sikorsky S.58 is already in service with the U.S. Marine Corps and U.S. Navy, and the French have used many in Algeria.

The prototype of the British version, the Wessex, which is being built by Westlands, flew recently and looks promising, but production models are not likely to be ready until 1959 or 1960. As a temporary measure the latest mark of Westland Whirlwind (S.55) might be used, with a slightly higher performance than the Whirlwinds used at Port Said.

Twenty S.58's carrying 11 men each gives a powerful punch. But it is important to get the helicopter carrier in perspective. It is not the answer to all cold war problems. It has its limitations like every other weapon.

Sometimes it can act on its own, but usually it must work as part of a team.

It would probably operate with a carrier task group, the aircraft from the strike carrier giving close support to the lightly equipped helicopter-borne forces. But even with air support there will often be incidents beyond the powers of a carrier task group.

L E T US consider a cold war situation where a minority tries to seize power in a remote place.

The carrier task group and the helicopter carrier are rushed to the spot, and the helicopter-borne force, supported by air strikes, saves the immediate situation and forces the enemy to the defensive by hitting them continually in unexpected places.

Meanwhile, troops from the strategic reserve are flown from Britain to an airfield within striking distance, and when the helicopter-borne force captures an airstrip the troops are flown in.

These troops would have been immobile because of their lack of transport, but often they too can do more than just make one commando mobile; since it can give the strategic reserve a power it would never have had.

The helicopter carrier and the carrier task group are not to be seen as rivals. There will often be occasions when the helicopter carrier can act on its own, but its greatest value will often lie in giving striking power to the strategic reserve.

The idea of using helicopters in amphibious operations started with the United States Marine Corps.

After Hiroshima they saw that the World War II concept of amphibious assault, with great concentrations of shipping and troops, would not work against an enemy with atomic weapons.

Helicopters offered a way to capture a beachhead without providing atomic targets, and to win the land battle quickly.

The Marine Corps had been studying helicopter operations for years. They already have a converted escort carrier, the C.S.S. Theis Bay, carrying 20 helicopters and 1,000 marines, as a forerunner of this kind of ship. In terms of large numbers of helicopters playing the main part in the landing, Britain may never have enough helicopters for this, but even one helicopter carrier could have a great effect in an amphibious assault.

Troops could attack the beach defences from behind, or could capture bridges or other vital objectives inland. They could knock out enemy batteries, or fly observation posts or guns on to the enemy's flank.

AFTER the capture of the beach, the helicopter could be used to launch stores ashore, straight to the forward troops (so cutting down the number of vehicles to be landed), or could give mobility to reserves in the beachhead.

During the break-out battle they could again put down troops behind the enemy, and in the advance inland they could give the force great mobility, sometimes enabling it to do without ground lines of communication.

Some of these jobs could be done by paratroops. But helicopters have greater power to choose and change landing zones. Besides the helicopter-borne forces can be used several times, and the helicopters can pick up troops who have had no special training.

The main argument against helicopters in later amphibious operations is vulnerability.

However, experience in amphibious operations is to land the helicopters away from enemy fire — "hit em where they ain't" is a U.S. Marine Corps slogan.

A helicopter at Port Said had 20 bullet holes, including six in the rotor blades, and still flew.

In Algeria, aircraft frequently come back riddled with bullets, and very few have been shot down.

With self-sealing petrol tanks and body-armour for the pilot, helicopters will be even less vulnerable.

Anyway, the basic principle
NEWS OF THE WORLD'S NAVIES

N.A.T.O. EXERCISES

LONDON: It has been said that anything a conventional submarine can do the United States Navy's nuclear-powered submarine Nautilus can do heretofore and longer. Those concerned in the autumn N.A.T.O. exercises had an opportunity of assessing the importance of this submarine as a weapon of war. It is certain that the Nautilus will figure importantly in the main exercise analysis, but the known facts of her performance alone appear to justify claims made for her.

When she surfaced in the English Channel at the end of Exercise Strike Back she had cruised submerged for approximately 14 days, she had covered a distance of 5,007 miles — she had done this at an average speed of 15 knots — and she had made her deepest dive, though for security reasons the actual depth reached has not been announced.

While the submarine was at Devonport the First Sea Lord, the Minister of Defence, and other VIPs were received on board and went for a short cruise in the English Channel.

They were able to assess the submarine's potential as passengers for five hours.

They were shown all over the vessel and United States officers explained in detail the construction and method of operating the boat. They also explained the results obtained during the N.A.T.O. exercises. "It was an unforgettable experience," said the Minister of Defence when he stepped ashore afterwards.

"With her exceptional speed, her capacity to dive to considerable depths and her remarkable manoeuvrability, this nuclear submarine represents in the sphere of naval warfare a revolutionary advance as great a change from sail to steam."

One of the things which impressed the party most was the accommodation for the ship's company, which is more spacious than in conventional submarines, as the nuclear reactor and propulsion machinery take up less space.

It was a preview of what conditions may be expected by the ship's company of the Dreadnought, which will be the Royal Navy's first atomic submarine.

ATOMIC NAVY

Encouraged by the success of the Nautilus, the United States Navy intends to have a small fleet of atomic submarines within the next decade.

Already the second nuclear-powered boat, the Seawolf, a raft of some 2,700 tons, is in service and six others are under construction.

Four of these are medium-sized attack vessels. Skate, Swordfish, Seadragon and Sargo, another is the Skipjack, a single-screw high-speed attack submarine, and the sixth is the Halibut, the first submarine to be designed as a guided missile boat.

In addition, some four or five other boats are to be built.

One of the most important projects is that of the Triton, a radar picket submarine. This will be the largest submarine ever built by the U.S. Navy and the first one to have two nuclear reactors.

The Halibut is not far distant when submarines will carry and fire intermediate range ballistic missiles, according to Rear-Admiral Rickover, the man responsible for the building of the Nautilus.

These he calls "underwater satellites."

They would be nuclear-powered and carry a weapon with a range of 1,500 miles, similar to one which the U.S. Navy is at present developing.

While this type of submarine cannot be built immediately, it is feasible and has a tremendous potential.

Of finding and destroying it, according to Admiral Rickover, would be like "trying to find a black cat on a vast and empty, moonless and staries night."

U.S. plans for nuclear-powered ships are not confined to submarines.

Congress has authorised the building of a nuclear-powered guided missile cruiser. This will be the Long Beach, the contract for which has been awarded to the Bethlehem Steel Company of Quincy, Mass.

The power plant being developed for this vessel by the Westinghouse Electric Corporation will give it a range greater than that of existing fleet escort ships.

Its armament will protect Task Forces against air, surface and undersea attack.

Congress has also authorised the construction of a nuclear-powered aircraft carrier, and the Navy hopes that a large destroyer type of nuclear-powered ship may be included in an early building programme.

HELMET OPTER CARRIER

Reports that the Admiralty is planning to convert an aircraft carrier for use exclusively as a flying base for helicopters have been discussed in the Press and commented on as a logical outcome of the changed activities of the Royal Navy in the Far East.

During these operations last November some 300 officers and men of 45 Commando, Royal Marines, were landed in 91 minutes from H.M.S. Thetis and H.M.S. Ocean in a force of six nuclear-powered Whirlwind and some Sycamore machines of an Army experimental unit.

This was the first time for helicopters to be used in a battle role.

While no official credence is given to reports the success of the helicopter landings at Port Said is clearly an indication of the value of an aircraft carrier for carrying helicopters to land troops, particularly where speedy police action is necessary.

This lesson most certainly has not escaped the naval staff, or the Royal Marines, who see in it a modern method for performing their time-honoured role.

A helicopter carrier would be an important unit in a carrier task force and it would obviously increase the flexibility of the Fleet Air Arm and the mobility of the Royal Marines.

The machine which would most probably be used in such a role would be the Westland Wessex, a large number of which are ordered.

They will carry about 15 men with full kit, a considerable advance on the carrying capacity of the Whirlwinds used in the Suez Canal zone.

R.A.N. COLLEGE MOVES

MELBOURNE: The Royal Australian Naval College at Grib Point (Vic.) will close on December 6 and re-open at Terrigal, near Sydney, on February 1, 1950.

The transfer of the college has already begun.

R.A.N. ships have carried to Sydney equipment, furniture and boats not needed until the New Year.

The College is to be named H.M.A.S. Creswell, after the late Vice-Admiral Sir William Creswell, known as the "Father of the R.A.N. College."

SUI. CIRCLES WORLD

LONDON: H.M. Submarine Thorough, which left Sydney on October 7 after service with the Fourth Submarine Squadron, will have sailed around the world by the time she berths at Portsmouth a week before Christmas.

It is believed that she will be the first submarine to circumnavigate the world.

Now commanded by Lieutenant-Commander R. C. H. Mason, R.N., the Thorp originally sailed from Portsmouth in October, 1949, and made a passage by way of the Mediterranean and the Suez Canal to Australia, where she provided anti-submarine training for ships of the Royal Australian Navy and the Royal New Zealand Navy and units of the Royal Navy based in the Far East.

She is returning to Britain across the Pacific and through the Panama Canal, a journey home of more than 12,500 miles.

She is scheduled to arrive at Portsmouth on December 17.
THE SUPERMARINE SCIMITAR

As it will not be long before Naval aviators come to grips with this large and potent monoplane, it seems a good idea to give them a general introduction to the aircraft, describe cockpit systems and handling characteristics and give them such information as security will allow for examination and future developments.

Compared with current single-seat Naval strike-fighter aircraft, the Scimitar is large in size; "immense" has been unkindly used for it. This larger size has, broadly, three causes: Nearer twice the weight of useful load is carried; there is a higher thrust-to-weight ratio giving a very high initial rate of climb; and greater range and endurance is provided. Further, the aircraft has plenty of development potential. A wide variety of equipment is already planned for the different roles and design studies for continued improvements are under way.

These are possible because recent tests with the blown flap have been very satisfactory and the aircraft is well within the limits of the ship's gear. More details of the operational equipment and its development are mentioned below, but we will start on details by describing the cockpit.

Starting at the port side aft, we come to the emergency flap undercarriage hook levers and the J.E.F. and V.H.E. control boxes. Immediately aft of the throttle quadrant are the rud and standby tailplane trim indicators. The throttle is individually gauged on the long bank of vertical-scale indicators. The pointers for each tank are all in line with the fuel indicator system so that it is functioning correctly.

In the event of it not doing so, the fuel can be manually balanced by means of the three position switch underneath the gauges.

To the right of the throttle quadrant, are the grouped engine start switches, and above it the starting control switch.

To the left of the main instrument panel, from top to bottom, are the arrestor hook lever, cockpit emergency lights, and there is also a standby tailplane flap control. A small reduction in the available g. Since each hydraulic system is provided with two pumps, one on each engine, the failure of one system will not occur due to an engine or drive shaft failure.

The main instrument panel, forward, is divided into three parts: on the left hand side are the engine instruments and gauge sections, the main instrument panel is in the middle, and on the right hand side are the controls and sighting devices. Below the main panel are the trim indicators, pilot heat switch, instrument earth switch and override switch for use with drop tanks.

Longitudinal and lateral trim is obtained by the four-way control column and there is also a dedicated trim switch on the port console. The trim indicators are "dolls' eyes" and are trimmed white for take-off, and the black when the weight comes off the undercarriage legs. The brakes are double-actuated, and may be turned off by pulling out the T-lever (to be repositioned central, top of main instrument panel).

The hood is force-jettisoned by pulling the lever on the inner side of the port console. The aerials are also of the "dolls' eye" showing white when airbrakes are out.

In the event of any of the above items, the main instrument panel layout conforms to the latest N.A.T.O. requirements (unless this is again altered whilst this article is in print).

The engine instruments and fuel presentation are on the right of the main panel.

Each fuel tank is individually gauged on the long bank of vertical-scale indicators. The pointers for each tank are all in line with the fuel indicator system so that it is functioning correctly.

In the event of it not doing so, the fuel can be manually balanced by means of the three position switch underneath the gauges.

To the right of this switch can be seen the cabin altimeter and three "dolls' eye" indicators for engine fuel pressures.

A Bowser showing rate of flow and pounds of fuel gone will also be fitted here.

Above the main fuel indicators is a "totalising" fuel gauge which reads the last 2,000 lbs. Alongside are two J.P.T. gauges. The two instruments next above are the t.p.m. indicators which are (at) calibrated in per cent, r.p.m.

Coming down to the starboard console forward we have the centralised warning system, comprising a total of four "vitally" vital failure — cabin pressure, wing fold, two generators, two hydraulic pressures, compressor port and starboard, and fire warning port and starboard.

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Engine failure and landing with one engine on pedal control causes no headaches. This is a convenient point to mention the flaps, which are operated by a link in the tailplane and maintain the aircraft in trim. As the trailing edge flaps go down, the nose flaps and "blow" come into operation. For landing, the flaps go down fully and bring in the fuselage flaps.

Climbing and landing aircraf t is difficult to control accurately in pitch. The reason for this is that it suffers a nose-down trim change corresponding to a degree of tailplane angle in going from M = .85 to .95.

The position is aggravated by inadequacy of the tailplane system which are manifest to the pilot in the form of a slight lag from stick movement to aircraft response.

A similar problem exists on the aileron control, making it difficult to fly the aircraft level with a degree or precision of control.

As a result, both the tail and aileron controls have been subjected to a "five-star" light test programme and (dare one say it?) we think we now know the answer.

The departures from straight and level flight were off to an extent of 12 degrees which, surprisingly, feels quite comfortable and normal.

Flap blowing is used for the extra lift available more than outweighs the loss of engine thrust: the minimum launching speed is, in fact, about 10 knots less with blow on than off. A further reason for using blow is a marked improvement in fore-and-aft controllability.

At the time of writing, the aircraft has not been catapulted with external stores.

Climb, high-altitude handling.

These are the aspects which at present leave most to be desired. (The words "at present" need emphasising, as the course. We hope squadron pilots will never know there were any problems.)

When climbing at the best climbing speed the aircraft is slow to respond to full stick command and a "sprint" into the target will be possible at Mach 1, when carrying the bomb and drop targets.

A feature of the aircraft is the enormous strength for this role, the design diving speed, for example, is in the supersonic level. Other than for the "sprint" an economical cruising speed of about 100 knots would be preferred.

The range of "loiter" time can be extended by dousing one engine, the directional trim being so negligible that no one has yet failed to relight a serviceable Avon at low level!

Landing-on: A brief description of the flap blowing system may not be out of place here.

The jet of air, blowing at about 150 knots from a fixed nozzle, follows the same path as the air down to flow downwards and aft.

This deflects a large mass of air and about doubles the effective area of the tailplane.

The effect of blow, coupled with increased flap area, was proved during recent trials to have increased the approach speed of the Scimitar very considerably (compared with the double-slotted flap version). The result is this very acceptable and speedwise improvement there were some very satisfactory gains in the handling qualities at the point, namely, a more nose-down attitude, excellent engine handling (r.p.m. on the approach averaged 81 per cent.) and improved longitudinal stability.

As already mentioned, audio control is very powerful and effective on the approach, two very necessary ingredients of a good deck-landing aircraft.

The first prototype Scimitar flew in January, 1956. The first series of deck landings took place in H.M.S. Ark Royal in April, 1956.

Both the second and third prototypes, and the first production aircraft flew within 12 months of the first aircraft.

There were 10 aircraft engaged on development flying by June, 1957, and it is hoped to start a Service Intensive Flying Flight before the end of summer.

The first unmanned squadron will follow a few months afterwards.

Development flying will clear the basic aircraft and the wide variety of alternative equipment carried in the different roles.

While early aircraft should be operationally effective, continued development is planned.

For example, a new navigational system will improve the strike role and an alternative armament to the 30 mm. cannon will improve the aircraft in the fighter role.

Both these roles will be aided by the introduction of an automatic pilot. Further developments are being actively pursued.

Besides these two principal roles the Scimitar is intended also for fighter reconnaissance and ground-attack duties. In the former case the folding nose and camera nose were added.

These alternatives and additions have resulted in little increase in the aircraft's weight. The basic airframe is being continually refined as production continues and over half the weight is military load and fuel.

The fact that a Naval aircraft is now one of the country's two fastest single-seaters is a tribute to the careful planning laid down some years ago in D.A.W. and the close liaison with the Ministry of Supply, from which the writers would like to acknowledge.

From the London "Navy"
TON DON: British murine cost in view of the enormous surface craft. Tankers probably will cost million lowered submarine oil tanker. With nuclear-powered surface marine tankers. Strategical importance of submarine. The U.K. Government might co-operate. It has been suggested that the interest in the experiments and Bureau (Australia) reports that

Oil companies have evinced interest in the experiments and it has been suggested that the U.K. Government might cooperate in defraying the initial cost of view of the enormous strategical importance of submarine tankers. In the meantime, German and Japan are experimenting with nuclear-powered surface tankers.

Germany hopes to have her first tanker off the slips by 1961.
The book, however, can be warmly recommended. Mr. Weiglmann has not only taken an enormous amount of trouble over its production and the illustrations are really excellent. The Admiralty Archivist, Lieutenant-Commander P. K. Kemp, has written an introduction.

--- From the London "Navy."---

**BIG SHIP**

"Ark Royal," 1930-1941. "by William Jamieson; published by Hart-Davis (1 V.)."

The story of the Ark Royal, the third ship of that name to have served in the Royal Navy, and affectionately remembered by thousands who knew her magnificent record in the last war, is beautifully told by Admiral Jamieson.

Particularly is his book impressive because of the human side of the ship in the ship is so extremely well blended with the technicalities.

"There is 'atmosphere' in every page, and the fine spirit which pervaded the carrier's company and her air crews is brought out naturally and spontaneously.

There is lots of fun in it, too, as witness this extract in connexion with one of the many visits the "Ark" paid to Gibraltar when she formed a part of Force "H." Once again the island round had the ArkRoyal in its grip... . Two very senior officers returning to the 'Ark' after curfew time that night, were held by a sentry at the point of a bayonet until released by a very mellow libertyman who alone could remember the password.

The book will not only give much joy to those who served in the old Ark Royal, but will provide the public with a story of the first flight with its splendid pictures of "big ship" life during the Second World War.

--- From the London "Navy."---

**MARINE PROPULSION BY NUCLEAR ENERGY**

By ALEXANDER CAMPBELL

In an A.B.C. broadcast

MARINE propulsion by nuclear energy is feasible; two are in the first and eight in the second.

This has been proved by the extensive nuclear submarine programme of the United States and by the experience of reactor operation in the United Kingdom.

The problem of commercial use is, then, not in the actual engineering, but in developing a reactor which will give power costs competitive with the conventional methods.

In the sphere of military use, on the other hand, there are factors which may outweigh any technical disadvantages.

In the military field, the greatest effort has been made in the United States, where a large submarine programme is under way.

For this, the main reactor chosen has been the pressurised water reactor, although a reactor using liquid sodium as coolant was studied, but later abandoned, as the United States Navy does not intend to continue with sodium cooling.

The Union Kingdom has announced its intention to build a nuclear-powered submarine, which will also use a pressurised water-reactor, similar to that used in the Nautilus.

Another prototype reactor for submarine propulsion will come into operation at Harwell later this month.

Known as Neptune, this reactor will be a homogenous reactor. That is, the fuel and moderat or are in form of a solution, which will act as its coolant.

The United States also intends to build two nuclear-powered warships—a guided-missile cruiser and an aircraft carrier—powered by pressurised water reactors, two in the first and eight in the second.

This multiplicity of reactor units will mean that the ship can continue operational although some of the reactors are out of operation.

For merchant shipping, a reactor producing power competitive one halfpenny sterling per shaft horse-power hour, the present cost of oil-fired ships, must be developed.

Costs of about 0.8 cent per unit can be obtained by the large graphite moderated reactors. An experimental reactor at the United Kingdom electricity authorities, but it remains to be seen whether this system would be economically competitive when scaled down for ship use.

Because of the higher capital costs of a nuclear power unit, the system chosen shall have to use a low enrichment fuel to give a low running costs to off set the high capital charges.

To benefit from the low fuel costs afforded by natural uranium, the ship would have to be a large ship which spends most of its time at sea, such as an oil tanker, because the reactor would necessarily be large and heavy.

Nearly continuous use of the power unit is desirable to allay the high capital cost. It has been decided to build a nuclear-powered tanker in the United Kingdom, whose operating costs should be competitive.

For smaller ships which spend relatively longer time in port, it may be that a smaller reactor with lower capital cost will be adequate (Please turn to page 30).

--- From the London "Navy."---

**RECENT DEVELOPMENTS IN A-S AIRCRAFT**

By M. J. HARDY

RUSSIA'S recent claims to have produced and fired successfully an intercontinental ballistic missile has tended to overshadow somewhat an equally potent menace in possession of the Kremlin: A submarine fleet believed to number more than 500 vessels, which is being added to at the rate of 60 to 70 ships a year.

Yet to the general public it is view of this missile and the supersonic bomber, i.e., the threat from the air, that is the most dangerous, and the submarine tends to be bracketed with the tank and the piloted aircraft as a weapon of the past and present rather than of the future. Yet the modern submarine can carry guided missiles with conventional or thermo-nuclear warheads, and can therefore be considered a factor as the demands of national economy in dictating the small size of this country's anti-submarine fleet.

Certainly our limited foreign defence budget demands that good value is obtained for the money spent, and British anti-submarine aircraft have not been found wanting in this respect. The Westland Wessex helicopter, a version of the Sikorsky S.55 built under licence by Westland Aircraft Ltd., of Yeovil, unlike the piston-engined S.55, which is in service with the U.S. Marine Corps and U.S. Navy, the Wessex is powered by a gas turbine.

The other type of power plant is being applied to more helicopters; that fitted to the Wessex is a 1,450 h.p. Napier Gazelle.

The Wessex can do approximately twice the job of the S.55 Whirlwind and its turbine engine means that ships need not carry petrol, only all-paraffin fuel.

The prototype Wessex was actually built in America and after its first flight with its British engine only a few months ago. It should not be
LONG DELIVERIES ARE BEING MADE

Screws.

Coupled together to drive two four-bladed contra-rotating air-

service with the Navy.

Wean.

Long, however, before produc-

tion deliveries are being made

from Yeovil to Naval units.

The Wessex will be armed with some kind of homing
gun.

Westland has been producing the smaller Sikorsky S.55 for
civil use and may use for some
years now, and many are in
service with the Navy.

American-built Wessex helicopters equip the Navy's first helic-

toitter anti-submarine unit, No.

815 Squadron, which used the "dunking boat" technique to
detect submarines.

A new version of this aircraft, the Whirlwind H.A.S. 7, is now
being produced at Yeovil; the Mark 7 has an Alvis Leonides
Major piston engine and is
armed with an anti-submarine
homing torpedo in a special
bay under the cabin floor, which
has been raised to accom-
modate it.

This new version of the Whirlwind is now undergoing
proving trials with "H" Flight of No. 700 Squadron at
Lee-on-Solent. This Flight was formed as recently as 18th
March this year.

With another Whirlwind
equipped to detect submarines,
the Mark 7 version could form a
"hunter/killer" team. The larger
Wessex is very probably
capable of both hunting and
killing.

THE Royal Navy con-

tinues to rely on its turboprop
Fairey Gannets for submarine
protection, and it was recently
revealed at Farnborough that
this aircraft could carry two
homing torpedoes in addition to a
considerable variety of other
weapons.

The Gannet is powered by an
Armstrong- Siddeley Double
Mamba turboprop. Each Mamba
consists of two "single" Mambas
coupled together to drive two
four-bladed contra-rotating air-
screws.

For long periods of cruising,
one Mamba can be stopped and
the aircrew it drives idles; when a submarine is sighted, the
whole engine is started again and full power is available for a
last run over the target.

France's Breguet Alize (this
civil name means "Trade Wind") is rather similar to the Gannet in
appearance, although it is not
quite such a sophisticated
design.

It is powered by a single
Rolls-Royce Dart turboprop,
and is intended for the French
armed forces abroad.

Like the Gannet, the Breguet
design carries a crew of one
pilot and two observers, but
whereas in the Gannet the three
crew members are seated in
tandem, the Alize's pilot is seated to port and the two ob-
servers, each with a radar scan-
dar, to starboard.

This enables the observers
to change seats in flight to avoid
boring on a target aircraft.

Catapult trials of this aircraft
have been successfully com-
pleted at Farnborough, and 100
were ordered from France for
the Royal Navy; the first Alize
squadrions will probably be
formed next year.

An unusual feature of this aircraft is that the main wheels
retract forwards into fairings on the wing leading edges; these
fairs also serve as the anti-sub-
marine front end of their landing
gear and landing lights. Bombs and rockets can be carried
both externally and in the fuselage below the tailplane.

Something that few people
could have foreseen in the war
was that the modification of a
turboprop engine into an anti-
submarine aircraft might be
totally feasible.

An interesting French de-
velopment in this direction was
the H.D.35 — an ungainly-looking twin-engined, high-wing monoplane with a
fixed undercarriage and a nine-

aspect ratio wing (i.e., one that
is long and narrow, like a
plank).

This was a development of
the earlier Hurel-Dubois H.D.31
which was sold to the Italian
and the H.D.31 was handled over to the
French Navy for evaluation last
year.

THE H.D.31 series is
intended to use small
undeveloped fields and has
anti-submarine and anti-aircraft
which is so important to the
modern and anti-submarine
aircraft.

The H.D.35 has an endur-
ance of 20 hours at 100 m.p.h.,
and features an MAD (Magnetic
Airborne Detector) installation in
the rear fuselage and search
radar under the nose; it could
also carry homing torpedoes.

Orders have been placed for
something like 50 aircraft for
the R.C.A.F., and the type has
been evaluated by the U.S.

Navy.

The Argus can carry a very
large load of weapons includ-
ing, one may assume, mines,
depth charges, anti-submarine
torpedoes, homing torpedoes,
air-to-surface guided missiles.

There are no fewer than 21
distinct radio or radar installa-
tions, including very possibly
direct radar mounted in a
promptly bulge under the nose,
and an MAD housed in a long,
oneshaped fairing at the
tail unit.

The crew of 15 will enjoy
the benefits of a spacious
starterage with ample cooking and
rest facilities as well as effective
soundproofing (crew comfort is
very important in ocean patrol
aircraft, and excessive engine
noise can cause great fatigue on
long sea journeys).

It is perhaps paradoxical
that although the Westland
Wessex, Breguet Alize and
Canadair Argus are so similar
externally, they are all
designed for the same basic
use. But this diversity of de-
sign features and basic configu-
rations serves to emphasise the
immensity of the submarine
menace, and the number of dif-
ferent ways in which it must be
tackled from the air.

The Royal Navy

December, 1957

INTO THE MISSILE AGE

BY B. J. HURREN — IN LONDON

SOME Americans talk big for
one simple reason: They
are big. Just such a one is
John Smith Blair, III, who from his H.Q. in Ger-
mans has recently gone on
record with an epic statement:
"I have more firepower at my
fingertips than any commander
in any war in history."

Grandiloquent though his
words are, the colonel still un-
derstates the case. In fact,
he dispose more firepower than all
the wars of history lumped to-
together, he commands four
battalions of atomic cannon and
three of assorted atomic
missiles.

The choice of piston engines
may seem a retrograde step, but the turboprop's fuel con-
sumption at low altitudes
(where most submarine hunt-
ing is done) is greater than that
of a piston engine.

The Canadair Argus will
thus be able to employ Britain's
exceptional fuel capacity to the best advantage,

and it will undoubtedly have a
very long range. And, although
it has a maximum gross weight of
189,000 lb., it is fast — the
maximum speed is 530 m.p.h.

The first Argus made its first
flight in March of this year and
the Royal Canadian Air Force
should have taken delivery of
their first Argus by the time
these words appear.

Orders have been placed for
something like 50 aircraft for
the R.C.A.F., and the type has
been evaluated by the U.S.

The Argus can carry a very
large load of weapons includ-
ing, one may assume, mines,
depth charges, anti-submarine
torpedoes, homing torpedoes,
air-to-surface guided missiles.

There are no fewer than 21
distinct radio or radar installa-
tions, including very possibly
direct radar mounted in a
promptly bulge under the nose,
and an MAD housed in a long,
oneshaped fairing at the
tail unit.

The crew of 15 will enjoy
the benefits of a spacious
starterage with ample cooking and
rest facilities as well as effective
soundproofing (crew comfort is
very important in ocean patrol
aircraft, and excessive engine
noise can cause great fatigue on
long sea journeys).

It is perhaps paradoxical
that although the Westland
Wessex, Breguet Alize and
Canadair Argus are so similar
externally, they are all
designed for the same basic
use. But this diversity of de-
sign features and basic configu-
rations serves to emphasise the
immensity of the submarine
menace, and the number of dif-
ferent ways in which it must be
tackled from the air.

The Royal Navy

December, 1957

INTO THE MISSILE AGE

BY B. J. HURREN — IN LONDON

SOME Americans talk big for
one simple reason: They
are big. Just such a one is
John Smith Blair, III, who from his H.Q. in Ger-
mans has recently gone on
record with an epic statement:
"I have more firepower at my
fingertips than any commander
in any war in history."

Grandiloquent though his
words are, the colonel still un-
derstates the case. In fact,
he dispose more firepower than all
the wars of history lumped to-
together, he commands four
battalions of atomic cannon and
three of assorted atomic
missiles.

The choice of piston engines
may seem a retrograde step, but the turboprop's fuel con-
sumption at low altitudes
(where most submarine hunt-
ing is done) is greater than that
of a piston engine.

The Canadair Argus will
thus be able to employ Britain's
exceptional fuel capacity to the best advantage,
I.G.Y. IN ANTARCTICA

It will come as a surprise to most to know that exploration, survey work and geology are not included in the scientific programme of the International Geophysical Year. Most of the I.G.Y. work is concerned with observations to be made from fixed stations, using complicated modern equipment—observations of the electricity of the upper atmosphere, of the aurora and cosmic rays, of the earth's magnetism, of local and regional meteorology, and gravity and seismology.

In Antarctica the scientists concerned will follow a routine similar to that which they would follow at an observatory in a temperate country, and the inside of a physics laboratory at our Mawson station looks much the same as a physics laboratory in a university.

The duties of these observatory scientists may not be as dangerous as those of men working out in the field, but they are every bit as hard, and in many ways demand more of the man, in self-discipline and determination and energy, than does the more glamorous exploration work on our station.

I am not trying to detract from the credit due to the man who battles out by dog-sled or motorised vehicle over the Antarctic plateau.

I am simply trying to show that the man at base, with an important and onerous job, requires just as much guts, and deserves just as much credit, as the explorer.

The explorer works in bursts. He has the stimulus of excitement and new horizons, and often magnificent scenery; and his achievements are broadcast to the world.

The observatory man, on the other hand, must face an unrelenting routine which extends day after day without break until the end of his year of service, and no one hears of his solid, but unremarkable work.

The magnetician, for example, who without fail must do daily to the magnetograph hut, situated several hundred yards from the main station, to change the recording traces, and who must do this in fine weather or foul, even though it involves his crawling most of the way through heavy snow.

By P. G. LAW

In an ABC broadcast

I might point out that it is not much fun to ride in the middle of a winter's night and stumble in a blizzard along the rope to the meteorological screen (set up on the most exposed area of rock available), wrap the snow from the inside, and, with the aid of a torch, read the instruments.

Neither is it pleasant to stand for nearly two hours in midwinter in the open, behind a rather ineffective, wooden breakfast, and continue to twiddle the knobs of a theodolite with freezing fingers to track the path of a pilot balloon, which rises up and up until it bursts at a height of 40,000 feet or more.

This year, our Mawson men are a small meteorological and auroral observatory establishment, west of Mawson on a small island. Each week they tell two men there to relieve the previous week's operators.

The maintenance of this outpost throughout July, with all the flying involved, was very creditable performance.

Since then a party has hauled materials to this spot. They have established permanent base buildings, comprising two huts.

The men then pack up again, and after the arrival of the returned staff the whole outfit takes up the work of the station again.

The arrival of the reflected waves is detected by the microphones, and recorded on the instruments in the cab. The men then pack up again, and move on a couple of miles to the next service station.

In this fashion they proceed to run a line of readings for two or three hundred miles across the plateau.

Each night they sleep in a caravan, mounted on yet another sled behind the tractor. It may be all of two months before they return to their base.

When they are lying cosily in bed in your own home, perhaps you will give a thought to these tough young men and the important scientific work which they are accomplishing, for the results of their work will have important implications for man and for the rest of mankind.

I.G.Y. IN ANTARCTICA

At our stations we endeavour to arrange that each observatory man has a chance to go on at least one field trip.

This acts as a holiday break from the routine of his normal work, and gives him the experience, which he generally is anxious to gain before he returns home, of Antarctic travel.

Only if the physicist work as a team can this be done, for a man's specialised tasks must be taken over by one of his comrades while he is away.

The participation of scientists in field trips is also essential because in small parties, such as we provide at Mawson, there are no men available to whom to spread a year's field activities if the observatory men are not at times roped in to assist.

There is one aspect of field work which is included in the I.G.Y. programme and that is glaciology. One glaciology programme includes the measurement of the depth of ice at different points on the Antarctic plateau.

It has already been proved that at some places this ice is more than one mile thick. Imagine a train, consisting of a tractor, towing four or five sledges, moving slowly at about 4 m.p.h. over the wind-packed snow, several hundred miles inland. The temperature is --50° F., although the sun may be shining. At a given point, the train stops and the men pile out to carry out the work in which they have been drilled.

A surveyor sets up a theodolite to take sun shots, and a radio man runs out the aerial, listening in for time signals.

A seismologist enters one sledge, upon which is mounted a stainless steel cab, filled with an intricate array of electronic apparatus and instruments. His assistant begins to drill a deep hole in the ice, with an engine-powered drilling device mounted on another sledge.

Another man lays out a number of microphones on the snow surface surrounding the hole, but at some distance from it, and connects them by wires back to the recording cab.

When the drilled hole is deep enough—perhaps 30 feet—charges of TNT are wired together, and placed in it. The charge is then exploded, and the sound waves from the explosion pass down through thousands of feet of ice, to be reflected upwards again by the solid rock far below.

The arrival of the reflected waves is detected by the microphones, and recorded on the instruments in the cab.

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December, 1957
aw, and its flash observed in an aircraft 1,000 miles away.

Fifteen minutes after this man-made hell had occurred, the Marines were up and out of their trenches, going into mock action. Lesson One is therefore that with proper shielding the atomic terror delivered by missile is at some discount.

Applying this lesson to ships, then with comparatively straightforward design changes, the crew would be reasonably protected against anything other than complete disintegration of the ship. This could happen under the superheat of a near explosion the metal of the ship would melt.

There are three consequences of an atomic explosion, apart from the heat. All are killers unless there is a protective shield.

First there is the flash, which sets on fire things like curtains and wooden windows.

Secondly, there is the shock wave which, for example, causes buildings to collapse.

Finally, there are the gamma rays which are fatal to human beings.

In a warship, protection against all three is perfectly feasible.

While secrecy rightly masks what is being done, it can be assumed that all missiles will have atomic warheads.

From statements at ministerial level it is evident that perhaps more than a hundred firms in Britain are engaged in development and production of missiles of one form or another.

What is less understood is how much the lack of test facilities is imposing delays which are putting Britain behind in the race for re-armament.

It is known that the three Services are deeply concerned and affected by these delays, and that America, Russia and even France are jumping ahead of Britain. There is a test zone at Cardigan Bay and another 12,000 miles away in Australia — this, established for political reasons, could hardly be more inconvenient.

The types of missile for test complicate the issues. They are: Ground to air, air to ground, air to ground, ship to ship, ship to shore and shore to ship. To lay on one test may take weeks of preparation, with Army, Navy and Air Force in a queue for the vital few seconds that one missile occupies.

Missiles come into two main categories: Those which are guided, and those which are ballistic. The latter are entirely offensive; many of the guided missiles are defensive, e.g., those carried by fighters to destroy bombers, being fired air to air.

The ballistic missile, used for attack or fired, is a shot from a ship to intercept and destroy an oncoming missile, does not need guidance control after launching. But the very high range intercontinental type usually has a slave control built in.

—From the London "Navy"

NEW B.I. APPOINTMENT

Mr. Franklin Thomas Andrews has been appointed Commodore Chief Engineer of the British India Steam Navigation Company's Fleet, in succession to Mr. K. A. Miller, who has retired.

TANKER'S RECORD CARGO

What is claimed to be the biggest cargo of any kind ever to be shipped from Western Australia, and possibly Australia, in one vessel left the B.P. Refinery at Kwinana last month in the tanker Narek.

The cargo was 19,000 tons of marine diesel oil for Aden, one of the largest bunkering ports in the world.

The previous highest loading rate at Kwinana was about 1,500 tons an hour.

Continuing

Marine Propulsion by Nuclear Energy

From page 24

developed, although in this case the fuel rods would be larger since the reactor would require enriched fuel.

Two reactor types are being actively studied in the United Kingdom with this use in mind.

The first of these is the organic liquid moderated reactor, which uses an organic liquid as moderator and coolant.

The second is a gas-cooled reactor with a heavy water moderator, in which, because of the better moderating properties of heavy water, the fuel will not require to be as highly enriched as for the organic liquid moderated reactor.

A third possibility is the high temperature gas cooled reactor, using the uranium 235 thorium breeding cycle, and giving higher thermodynamic efficiency than the others.

These reactor types will probably be developed first of all as land-based reactors and the technology applied to marine propulsion.

It is unlikely that there is a reactor system which will apply to marine propulsion but have no land-based use.

A CHRISTMAS PARTY FOR FAR WEST CHILDREN

From page 27

Quartermaster Robert Ellis holds a little girl from the Far West Children's Health Scheme home at Mooly, N.S.W., as she cuts a Christmas cake on the Orient Line. Others were the test of forty children from the home who were guests of the ship in a special Christmas party.
I RATHER suspect that Nelson would have been a very smart Sea Cadet. Everyone, I suppose, knows that Nelson won the battle of Trafalgar, but how many people realize that he showed the same qualities of greatness all through his life?

The secret of his success was his personality, that "something" which it is so hard to describe in mere words. That he possessed this "something" to a marked degree is even more obvious when one considers the following two facts:

Firstly, Nelson was a very poor specimen from a physical point of view: at the age of twelve he was fragile and sickly, and would have stood no chance of passing the present-day Navy medical examination.

Furthermore, at the age of thirty-six he lost the sight of one eye after being wounded in action, and a few years later another wound resulted in his right arm being amputated. Only a man of Nelson's calibre could have survived such handicaps.

Secondly, it must be remembered that a very large number of men on the lower deck in the most intolerable conditions, often without any pay at the end of it.

Yet somehow Nelson was able to inspire these types of men with the highest degrees of loyalty and courage, as indeed he did everyone with whom he came in contact. One of his greatest attributes was the care he had for the welfare of his men, who were often at sea for months on end without a break. He first showed what sort of stuff he was made of when he sailed with his uncle, Captain Lutwidge, in a ship called Carcass on a polar expedition. Nelson and another midshipman slipped off in search of adventure and soon met it in the shape of a large and angry polar bear. When his musket misfired, Nelson grasped the barrel and advanced to fell the monster; the noise of a gun fired from the ship in the nick of time, however, scared the bear away.

When Nelson returned home, he reported himself to his uncle for rashness, and in doing so, he replied with dignity, "Sir, I was determined to kill the bear to take its skin to my father."

Near Death

Service in the West Indies followed during the American War of 1775-1783, during which time the climate and lack of proper medical supplies nearly finished Nelson off, but his spirit never failed and the Admiralty soon realised that he was an outstanding man.

In the peace that followed, he was given command of the frigate Boreas on the same station, and it is on record that such courage did he take of his men that not a single life was lost in his three years of command. That was a fine feat in those days.

In 1793, trouble broke out in Europe and then on till 1797, when Nelson was almost continuously at sea in the service of his country, in company with other famous admirals like Hood and JerVIS.

At the Battle of St. Vincent in 1797, when he was in command of the Captain, at a critical moment in the battle Nelson hailed out of line and placed his ship in the way of the larger part of the Spanish fleet. This unorthodox movement prevented the latter escaping, and, to make doubly sure, Nelson took his ship alongside two of them and captured them.

After this battle he was promoted to Admiral and from then on he never looked back.

The next year, only a few months after he had lost his right arm, he chased the French and ran them to earth, snugly anchored behind the sand dunes of an Egyptian Bay, and brought the whole French Fleet into two squadrons and approached the single line of the enemy at right angles, piercing it at many points and throwing it into confusion, as he intended.

And all that October afternoon on the deep blue water of the coast of Spain the battle raged until the British victory was reported to the Right Honorable Lord Viscount Nelson, who shortly afterwards died of his wound."

So ended the Battle of Trafalgar.

The Bluebird, a jet hydroplane, made two runs over the measured kilometre. The first was at a speed of 600 m.p.h., and the return run at 210.021 m.p.h. Campbell's previous record of 233.53 m.p.h. was set in September last year over the same course.

After making his record-breaking runs, Campbell's only comment was: "I really had a passing."

Campbell is 36 and the only man to better 200 m.p.h. in a water craft.

Since July, 1955, he has broken the world record four times — three times in the United Kingdom and once on Lake Mead, Nevada, U.S.A.

At right, Campbell enjoys a "cuppa" after his gruelling speed dash.
FOR SEA CADETS

Cadets Adventures in 
"Operation Survivor"

The following account of an exercise in which Geelong (Vic.) sea cadets took part is republished from the "Geelong Advertiser":

OPERATION SURVIVOR

held on the night of 15-16 November was an unqualified success. Officers and men of 1 Medium Regiment, Royal Australian Artillery, took the field and defended Geelong from "enemy seamen" who were "survivors" from an "enemy" ship "sunk" off Torquay.

Unfortunately, due to various reasons, the defending party consisted of only approximately 30 men. (Naturally, this would not be the case in the event of an actual military engagement.)

Nevertheless, 21 survivors were captured by the combined efforts of the Army and the Geelong police.

Fight cadets, Petty Officer Instructor G. T. Walker, Leading Seaman O'Shea and Sorenson, Honorary Instructor T. Thomson, Able Seaman Hutchinson, Ordinary Seaman Burnett and Quirk and Recruit Seaman Hosford safely reached their base.

They are to be congratulated on their initiative and fortitude in negotiating the hazards of barbed wire, brambles, creeks, police and army road blocks, army patrols, and, by no means easy adversaries, bulls!

From 8.15 a.m., the Commanding Officer's home (neutrality for the "survivors") looked like a refugee camp, with tired cadets lying everywhere.

Then, at 5.30 a.m., the last "survivor" arrived at the base safely and sound, having negotiated the obstacles from Torquay to Geelong only to get lost in West Geelong.

Several questions remain unanswered:

(1) Who were the cadets who ambushed the taxi and told the driver that he was their prisoner and was to drive them to Geelong (attempt unsuccessful)?

(2) Who owned the bull that frightened the daylights out of a certain cadet petty officer?

(3) Who was the cadet who, when stopped by an Army utility, said, "I am a cadet in an exercise, and have to get to Geelong, will you give me a lift?" (he was captured)?

(4) Who was the soldier hiding by a creek who burst into peals of laughter when he witnessed a band of cadets into flight?

And, finally, who, among all who took part in this exercise, did not thoroughly enjoy the experience?

TASMANIAN CADETS

Cadets from T.S. Tamar (Launceston) took part in a march to the Cenotaph with ex-Navalmen and Sea Rangers on Trafalgar Day. A wreath on behalf of the Navy League was laid on the Cenotaph.

Cadets from T.S. Emu (Burnie), ex-Navalmen and Sea Rangers marched to the Burnie Cenotaph on Trafalgar Day. A Cenotaph Guard was provided by the Sea Cadets during the service.

Cadets of T.S. Emu and T.S. Leven (Ulverstone), with Army Cadets from the Burnie schools, took part in a combined assault exercise on Turner's Beach.

T.S. Leven Cadets have now moved into their new headquarters on the banks of the Leven.

All the work of putting this building into service was done by members of the Ulverstone Sea Cadet Committee.

Three former sea cadets of T.S. Derwent (Hobart) have received commissions in the Navy, one in the Fleet Air Arm and two as sub-lieutenants in the R.A.N.R.

During the recent visit of H.M.A.S. Sydney to Hobart a party of sea cadets visited the ship. Two former cadets of T.S. Derwent, who joined the R.A.N., are now serving the Sydney—E.W.W.B.

A De Havilland Sea Venom makes its final approach over the round-down of an aircraft carrier. The Sea Venom is a two-seat, all-weather, day and night jet fighter now in service with the navies of Australia and Great Britain.

Fitted with the most up-to-date radar and electronic equipment, De Havilland Sea Venoms form a large part of the fighting power of H.M.A.S. Melbourne, Australia's newest carrier and the largest ship of the Australian fleet.

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