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THE SHAW SAVILL LINE

The Shaw Savill Line this year celebrates the 100th Anniversary of its foundation.

By a Special Correspondent

In March, 1858, two young men, Robert E. Shaw and Walter Savill, set up business in London under the title "Shaw Savill & Company." They did not have the capital to build or own ships, so they started business as brokers, chartering vessels to carry cargo and migrants to New Zealand. They adopted as their house flag the white, red and blue ensign of the Southern Cross which the English traders and merchants of New South Wales had chosen in 1834 to safeguard their trading ships' status at sea.

It remains to this day the flag of the Shaw Savill Line.

On May 28, 1858, the new company despatched the 455-ton iron screw steamer Lord Ashley for Auckland carrying Government dispatches and mails. It was followed soon after by the 892-ton sailing ship Avonlea, which round voyage to New Zealand and back lasted nearly a year. The following year the partners attracted considerable attention by the voyage of a Liverpool ship Spray of Ocean, which reached Auckland in the then unprecedented time of 83 days.

The sixties and seventies were the golden years of British sail and the qualities and performance of the company's ships at that time have never been surpassed.

In 1889 they purchased the Crusader, an iron clipper of 1,058 tons, one of the fastest and most beautiful sailing vessels of all time. In her day she was even more famous than the Cutty Sark, and did the passage from New Zealand to England in the almost incredible time of 69 days. At this time Shaw Savill were carrying passengers from England to New Zealand at rates ranging from 14 guineas for a first-class cabin to £16 for open berth steerage. The firm secured a Government contract for the carriage of migrants at £12 per head.

In 1882 Shaw Savill & Co. reached an agreement to amalgamate with Hendersons Albion Line. In the same year the iron screwing ship Dunedin, under this flag, pioneered the development of the frozen meat trade when she successfully carried the first cargo of frozen mutton and lamb from New Zealand to London. The venture almost founded at the start. After the 1,500 carcases had been loaded the crankshaft of the refrigerating engine broke and the cargo had to be hastily landed and sold in New Zealand. Nearly all the passengers, fearing a similar accident would send the ship to the bottom, cancelled their passages.

But after an anxious voyage of 98 days in which sparks from the funnel several times set the sides of the ship on fire and the captain narrowly escaped being frozen alive while investigating a fault in the refrigerating ventilaion, the Dunedin reached London with her cargo intact. Only one of the 4,311 carcases of mutton and lamb had to be condemned and the remainder, carried for 12,000 lb., sold at Smithfield at prices which heralded a revolution in the feeding habits of the British working classes.

With cheap food for the British workman's dinner went, hand in hand, new prosperity for the virgin lands of the Empire overseas. It was the shipping companies that provided the link that made both possible.

Soon after the amalgamation, Shaw Savill & Albion Co. Ltd. commissioned the building at Dumbarton of two steel, single-screw, two-funnelled, four-masted barque-rigged steamers with clipper stems, each of more than 5,000 tons.

Capable of up to 15 knots they offered accommodation of a kind never before seen on the colonial service, with bathrooms and electric light for all three classes.

They carried 95 first class, 52 second class and 200 steerage passengers.

This venture cost the company nearly £250,000, but this was amply repaid.

The first of these, the Arawa, on her maiden voyage in 1884, reached New Zealand after calling at Hobart in 38 days' steaming, and made the homeward voyage in 32 days.

At the time these ships were routed outward from the United Kingdom via Capetown and Tasmania to New Zealand, returning by Cape Horn, Montevideo and Rio.
By the time World War I broke out, the last of the company’s sailing ships which had long become uneconomic had been sold.

During the 1911-18 war the company’s ships took part in maintaining England’s food supplies in the face of German surface raiders and submarines.

It was the wireless operator of the Arawa who picked up from the Cocos Keeling Islands the faintly heard message that led to the destruction of the famous commerce raider Emden.

The company’s losses were comparatively light in World War I, but in World War II they were far heavier. Thirteen of the line’s 26 vessels were sunk, including 3 in a single day.

One episode in the line’s war record stands in a category of its own. The story of Captain Fegen and the Jervis Bay is one of the greatest episodes of British history, rivalling the death of Sir Richard Grenville and the last fight of the Revenge.

The Jervis Bay was requisitioned in September, 1919, by the Admiralty as an auxiliary cruiser and armed with eight 6-inch guns. In this capacity, with her peace-time officers and crew serving under a retired Naval officer, Captain E. S. Fogarty, she was escorting a convoy from Canada to England when on the afternoon of November 5, 1919, she encountered the German 10,000-ton battleship Admiral Scheer.

Seeing no other way of saving the convoy, whose only hope of escape lay in scattering quickly into the falling dusk, Captain Fegen in the unmanned Jervis Bay closed with the battleship and, hopelessly outranged and outgunned, succeeded in driving her fire until by the time she was sent to the bottom by her adversary’s 11-inch guns, 33 of the 37 ships of the convoy had made good their escape in perfect safety.

For this sacrificial action Captain Fegen, who had an arm shot off before his ship sank, was awarded a posthumous V.C.

Less spectacular but highly valuable was the war service of the Dominions Monarch, the line’s last surviving vessel of the Orion class, which during the war carried some 90,000 British, American and Dominion troops across the oceans.

It was the very extent of the company’s service in World War II that brought about in the decade that followed the virtual rebuilding of its passenger and cargo fleet to meet its obligations in the New Zealand and Australian trades.

The climax of that program of reconstruction and renewal which came in the company had replaced the cargo fleet. Harland and Wolff launched the 20,000-ton Southern Cross, a single-screw, oil-burning turbine passenger vessel of revolutionary design. She established for the first time the practicability of sitting engines and funnel aft in an ocean-going passenger ship.

She carried no cargo and because of her freedom from loading and unloading cargo could make four round-the-world voyages a year between Australia and the United Kingdom, the Panama Canal and South Africa.

It is now a century since the original Shaw Savill Company began its history in its modest office in Billiter Street, London, but from its grander premises in Leaden Hall Street the line still maintains the purpose and form of its original founders.

By PROFESSOR J. P. BAXTER, Vice-Chancellor, N.S.W. University of Technology

HYDROGEN POWER

(Written for the A.R.C. "Science Commentary" broadcast)

We are all familiar with the process of fusion, in which we get energy by causing certain very heavy atoms like uranium to break up into medium sized atoms, and in which the enormous energy is given out. We can cause fusion to take place by the action of neutrons on uranium at ordinary temperatures.

We have also known for quite a long time that energy can be obtained by causing very light atoms to join together, or fuse, to give somewhat heavier atoms, and we believe that the fusion of hydrogen atoms to produce helium is the process that provides the immense energy of the sun and of many of the stars.

This process takes place spontaneously in the sun, where the internal temperature is over 20 million degrees, and the problem of making it go on the earth appears to be mainly that of producing, in some way, conditions comparable to those within the sun.

The fusion can be made a little easier by using heavy hydrogen instead of ordinary hydrogen. Heavy hydrogen occurs to the extent of about one part in five thousand of ordinary hydrogen, and when we remember that hydrogen makes up about one-ninth of the weight of water, and that the amount of water in the world is so large, we see that supplies of heavy hydrogen are almost inexhaustible. Very approximately the fusion process, if it went with 100% efficiency, could provide all Australia’s power requirements for a year from something less than a thousand tons of water.

Clearly we cannot heat heavy hydrogen to temperatures of, say, 50 times so—rather more than 50 million degrees, even if we knew how to produce such temperatures, in any ordinary apparatus made of earthly materials. Before we reach 50 million degrees all materials we know of are boiled off as gases. We must therefore devise some other method.

The most promising at the moment is that of "hot" plasma, where a quantity of gas is heated to a high temperature by a powerful discharge of electricity through it, and maintained in a stationary and constricted space by electrical and magnetic forces, which prevent it from moving into, and filling, the rest of the vessel.

With this apparatus, a British group, led by Dr. Thoneman, an Australian, has produced temperatures of several million degrees for very short periods of time in a filament of heavy hydrogen gas.

It is thought that for the process to become self-sustaining, that is, to produce more energy from fusion than that which must be supplied to produce the high temperature, the temperatures of about 50 million degrees must be obtained, so the work still has some distance to go.

Most scientists believe that the problem will in due course be solved by man’s ingenuity and that fusion reactions will be carried out one day. There is more difference of opinion however, as to when that day will be.

Let us assume that the problem is solved, and consider its impact upon the world’s power requirements, and upon the development of fusion power, on which so much effort is now being spent.

The accelerating progress of industrialisation suggests that about the middle of the next century coal supplies will begin to get scarce. Oil will have gone, and hydro-electric power will be fully developed. Power from fission will carry man on for some time, say, another fifty or perhaps a hundred years. And then, without a new source of power, civilization will collapse in disorder. Fusion power, with its unlimited fuel resources, seems to be the answer to that problem.

You may find it hard to worry about the problems of the middle of the next century, though it is but a short time away really.

Let us first remember that power is a means to an end, and not an end in itself. A new source of power is only of interest if it is cheaper than the sources already available.

The cost of power is made up of three main factors. These are the cost of fuel, the capital charges on the power station, and the cost of transmitting the power from the station to the consumers.

The third cost will be much the same for any system, pro-
Fusion stations should also have negligible fuel costs, so the question of whether fusion or fission will give the cheapest power will depend mainly upon the capital costs of each type of station.

Now, since no one at present has any real idea what a fusion station will look like, no estimates of capital costs that is worth anything can be made.

There seems no reason at present, however, to think that fusion stations are likely to have lower capital costs than fusion stations. In fact, the contrary may well be true.

I do not think it likely that the comparison will be made in this way, but fusion and fission will compete for the world's power markets. Rather, I think they will be partners, and that they will be used in a strictly complementary fashion.

The fusion process will probably produce a large number of neutrons, which are of no value in that process, and which would have to be absorbed in shielding.

These neutrons could be used to make fissionable material by absorbing them in Thorium or Uranium 238, and the Uranium 235 that is not used for fission would also be used in fusion power plants in other places. The fusion power stations will probably be large central generating plants, and the fissionable material they produce as a by-product will be used elsewhere.

These fuels would be particularly suitable for small and mobile atomic power units. The two processes should thus work admirably in harness together.

It is quite clear that the investigation and development of the fusion process is well worth while and should be pursued. It would be wrong, however, to assume that if it is accomplished fusion will replace fission, or to reduce in any way the tempo of research and development work on fusion power stations.

We can, I believe, expect Uranium and Thorium to continue to be important materials, and to see fission atomic power stations play a major part in the future development of civilised man.

Like the human eye it uses a radio lens instead of a reflector, and it has a far wider range of vision than a human eye. If a reflector were used the various scanners would obstruct the actual radar beams. Also by using the lens, greater flexibility in aerial design is achieved.

The “radio lens” is made up of hundreds of short sections of different length wave-guides stacked together like a honeycomb. It has an “F” value of 1, which gives great collecting power than the best camera lens. There is one way, however, in which this “eye” compares the bar, though the human being. It sends out its own sort of illumination in the form of a number of narrow pencil beams, all sharing the same lens.

One of these is focused in elevation and provides the long range warning, while the others make a co-ordinate time-limited range attack from the air,” Earl Mountbatten said.

“The unintegrated, looking at this ship or seeing pictures of her, may wonder why she has an enormous ‘brain’ between decks, which, in conjunction with its ‘eye’ copies the human eye, and direct the ship to its course. It is essentially the brain, directed or maintained by the operational staff, which gives greater flexibility and judgment than his own eyes and brain could produce unaided.

These impulses, though quite meaningless in themselves, contain all the information on airborne targets which is needed by the operational staff.

To enable them to make full use of this information, there is a very complex display system which processes, stores and filters it so that it can be displayed in an easily intelligible up-to-date form. Range, height, bearing, speed and course are all provided and presented for easy use by a novel system of electronic writing.

**BLACK MAGIC IN THE FLEET**

**EQUIPMENT produced in recent years has revolutionised the effectiveness of modern warships and given the Navy power undreamed of in the past.**

The First Sea Lord, Admiral of the Fleet, the Earl Mountbatten, said this in London recently.

He was addressing the British Institute of Radio Engineers.

He singled out for special comment the combination of type 981 radar and its comprehensive display system which is essentially the eyes, brain and central nervous system of the ships (such as H.M.S. Victorious) in which it is installed.

"Integrated with the directing intellect of the human staff, it constitutes a device of almost fabulous performance without which modern warships would be relatively helpless, even for local defence against the long-range attack from the air," Earl Mountbatten said.

"The “radio lens” is made up of hundreds of short sections of different length wave-guides stacked together like a honeycomb. It has an “F” value of 1, which gives greater collecting power than the best camera lens. There is one way, however, in which this “eye” compares the bar, though the human being. It sends out its own sort of illumination in the form of a number of narrow pencil beams, all sharing the same lens.

“EVEN with all this elaborate and effective aid the operational staff of a warship, trying to compete with a mass air attack at modern high speeds and great altitudes, is faced with enormous difficulties. Almost instantaneous decisions have to be made of how best to use all available information, and that is the integration of man’s intellect with his creation. For this system cannot, of course, be used and directed or maintained without the human intellect.

"The human eye, on the other hand, is a device of almost fabulous performance without which modern warships would be relatively helpless, even for local defence against the long-range attack from the air," Earl Mountbatten said.
This is, of course, perfectly true and the comparison between these machines and the human brain applies only to the semi-automatic part which controls the routine functions of the body as necessary to carry out the directions of the intellect.

“This is precisely the case with an elaborate electronic system such as I have described. By itself it can achieve nothing. Its sole purpose is to serve its purpose and not the means. For maintenance must be kept to the bare minimum. It is, therefore, only by continuous and careful monitoring that the reliability of components and systems must possess a very high standard of reliability.

“When Type 981 Radar was first planned serious doubts were expressed whether the valves and other components would be sufficiently reliable for them all to be kept in working order at once. This equipment uses about 10,000 valves and 100,000 components. Nothing has ever been produced with a quarter of a million solid-state joints, with 275 slip rings to the revolving structure.

Cost of Equipment

“However, I am glad to say that this and other similar systems are now being operated and maintained at a very good standard of overall reliability, and this must reflect the greatest credit on all in the industry, from top management to the worker at the bench.

“There is, of course, a price to pay for such tremendous achievements and the financial cost is probably the greatest of these. I wonder if you realise the difference in costs between radio and electronic equipment in ships of the 1938 era and those of the present day. So staggering are these differences that I will quote a few.

“The cost to equip a frigate or destroyer in 1938 was £4,000; in 1958 it is £120,000 to £150,000.

“For a cruiser the cost in 1938 was £20,000; now it is £500,000.

“And for an aircraft carrier the cost in 1938 of £12,000 has now risen to more than £1 million.

“To this must be added, of course, the huge expenditure on research and development.

“The other price is that complicated systems call for a higher degree of skill and personal qualities in our sailors than ever before. The men concerned with equipment of this sort need the ability to think quickly, they need mental endurance and they need sound judgment both in operating the equipment and maintaining it.

“I am very glad to say that we are getting a sufficiently high standard of recruits coming into the Navy to meet this formidable but fascinating task.”

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THE NAVY

July, 1958

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The vital importance of Sea Power to the British is to insist by all means at its disposal upon the

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

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THE NAVY

July, 1953
cruiser, the former H.M.S. Aurora.

The Russians soon transferred warships, mostly mine-sweepers, motor torpedo boats, and patrol boats, and the Chinese added craft, either rechristened or built more or less to the "People's Navy" to seize some coastal islands from the Nationalist forces.

Although Chinese motor torpedo boats were available in 1954 to sink a Nationalist destroyer and in 1955 two motor gun-boats, Mao's navy, however, prevent the Nationalists from seizing two Polish merchant ships and one Soviet on the high seas.

In the last few years the Russians have handed over four destroyers, more submarine chasers and mine-sweepers and a number of submarines, about 120 warships altogether, so that the "People's Navy" is today far stronger than the "Nationalist Navy."

Further, at least six escorted "Riga" class, some mine-sweepers and small craft are building in Chinese yards at Canton, Shanghai, Kiautschou and Chariin, while several of the Nationalist vessels are in bad condition and of no fighting value.

Besides being protected by U.S. warships, the Nationalist naval forces may still be better trained; but these assets could disappear and then the Reds could launch an attack against Formosa.

The North Korean Navy, which consisted in the summer of 1950 of a few motor torpedo boats and patrol craft, was soon destroyed. Nevertheless, with the aid of local fishing craft, the North Koreans were able to mine several of the harbours they possessed and inflicted some losses upon the U.N.O. forces. Since the armistice, Russia is said to have put another dozen motor torpedo boats and a score of patrol boats, some mine-sweepers, and possibly even two or four submarines under the flag of this satellite, while about 70 local fishing craft have also been armed for harbour duties.

The navy of South Korea is, however, far stronger and better trained.

Finally there are a few patrol boats and river launches in the People's Republic of Viet-Minh. Relations in the Mediterranean are somewhat more complicated.

Although the only "true" satellite, had, for about 10 years, only a few patrol boats, motor torpedo boats, minesweepers, and a small craft, mostly of Italian origin, plus some vessels handed over by Yugoslavia before the disintegration of the satellite system, these laid the mines that caused the loss of two British destroyers shortly after the war. The war damages, however, insufficiently developed to permit the maintenance of stronger naval forces.

The olf-mentioned island of Saseno was later from being the "Red Gibraltar" and no submarines, except perhaps some pocket submarines, were based there. In the last few years, however, the Soviets have been making great efforts to improve the Albanian harbours and bases.

A floating dock has been towed there, coastal batteries have been built, and a naval mission installed. Soviet naval forces have started to pay visits to Albanian ports, and some more small craft have been stationed there, some of which are Russian manned. Although the value of the Albanian navies is no longer so great as that of the naval forces there — above all the submarines — it is generally grossly overstimated by Western press reports.

It seems quite possible that the Russians will, in the near future, base a naval squadron in Valona and other ports.

The two satellite countries have purchased Soviet warships and accepted Russian naval missions and instructors.

Egypt has bought two modern destroyers, four mine-sweepers, four submarine chasers, some motor torpedo boats and three or four submarines, while another three submarines may soon follow.

Although Egyptian ships' companies have been trained in Russia and Poland, it would be unfair to call Egypt a satellite; but it is certain that Egypt does not fully realize how dangerous it is to "ride a tiger."

Even more alarming is the case of Syria, with a strong leftist party in power, which has already bought some motor torpedo boats and patrol boats and intends to acquire two submarines as well.

The danger to the West in these satellite countries is therefore very much increased, while the strength these navies have thus gained, than in the fact that the Soviets have penetrated these countries, and in the propaganda value for the Communist cause.

Yugoslavia does not like to look abroad as a satellite, but while its politics between 1948 and 1955 were pro-western, at least anti-Russian, things have again changed since 1956. Tito's behaviour during the Hungarian revolt, his help to all satellites, and his recently acquired three or four submarines as well.

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It is interesting to note how the satellites of the Peace Treaties were committed with the full approval of the Soviet Union.

None of the satellite navies will be able to wage anything like an ocean war or to make a bid for "sea power," even if it is only in the Baltic or the Black Sea.

But these coastal forces should be able to defend their own littoral and to provide inshore escort and minesweeping forces, relieving the Soviet Navy of these tasks.

They may also clear such rivers as the Danube or the Oder of mines, and make themselves useful in many other ways to the Soviet Russian cause.

Morale and fighting spirit of the navies of the satellites may, however, prove very weak, and they may soon become a liability to the Soviets, rather than an asset.
ROCKETS FROM UNDER THE SEA

By MAJOR OLIVER STEWART, M.C., A.F.C.

One proposition will receive almost universal acceptance from both military and naval authorities. It is this: other things being equal, mobile rocket bases must be superior to static rocket bases. It appropriate launching pads for ballistic missiles can be moved from place to place and brought into action quickly on any new site they will be less vulnerable than if they were static. It is one of the oldest axioms of war that mobility is the master of everything else and it was knowledge of this axiom that led Members of Parliament and others to criticise the plan for landing American rocket missiles in Britain.

The intention, so far as it can be ascertained from the White Papers and official statements, is to set up a number of rocket stations from which—first American, then British—rockets could be launched. Now the world's first sophisticated ballistic missile, the German V2, was mobile. Could it be put on a special road conveyor and be put in place at any point? It is sometimes said of the more highly developed missiles of the present time, however, that they require a most carefully prepared base with a fixed launching pad and that they cannot be moved from place to place when they are in operational use.

On the other hand, the Americans declare that Polaris, the solid fuel rocket, is intended for launching from submarines. In other words, this rocket is highly mobile. Nothing has been said about how much the target, suffering from the elimination of a precision constructed, static launching pad. Here military secrecy, as in so many matters of modern defence, makes it difficult to reach final conclusions.

If it be accepted, however, that the Americans are justified in their claims for Polaris it must be concluded that some kinds of ballistic missiles can be operated from a mobile sea-going base. And that fact seems to me to be of the highest importance when our future defence planning is being considered.

For here is another military axiom: that the shorter the range, the greater the accuracy and the greater the force with which the enemy may be hit. The Royal Air Force stand-off bomb is based on this contention for it is nothing other than a bomb so designed and constructed that it can be delivered from closer range than could any form of ground-to-air missile. The bomber aeroplane carries it to a point as near to the target as the defences will allow and then sends it on the rest of its journey alone.

All talk about the "ultimate" weapon has omitted to take these fundamental facts into account. For an "ultimate" weapon capable, for example, of working at a range of 5,000,000 kilometres, will become a more accurate and a more powerful weapon (a more "ultimate" weapon) if it works at a range of 2,000 kilometres.

After all, the marksman hits the target harder and with greater accuracy as he shortens the range. It seems so absurdly obvious that it is the more puzzling that all consideration of the point should have been avoided or evaded when modern methods of defence were being discussed.

Probably a reason for the neglect of this basic fact of ballistics is that the thermonuclear warhead is now thought to be so potent, so destructive over such a wide area, that it will always have all the striking power that is required no matter what the range and that the more restricted kind of weapon is no longer necessary because of the immense area covered by a single explosion.

A logical case can be made out if this idea be accepted. If any future attack is to be entirely indistinguishable and if all thought of the relative importance of different targets is to be set aside, perhaps range no longer plays the part it has always played in the mobile defense, and the argument can be extended to include all the work that has been done for mobile bomb-carrying aeroplanes, all the mobile bases provided by ships and the mobile bases provided by ships at sea.

Perhaps the attack will be effective if it were simply directed against a county-size area irrespective of the city, town or country, to be laid waste and that acting conception, however, rules out the limited war and makes nonsense of all the work that has been done for mobile bases, mobile bases otherwise and mobile bases the smaller, more restricted kinds of atomic warhead.

Ten thousand times it has been shown that any stationary position is vulnerable. No matter what concrete and other protective materials are used, no matter whether the emplacement be sunk under the ground, or how it may be concealed, human ingenuity always has and always will find a way to spike the guns in a static base.

The static base is an illusion. The mobile base is the only kind that remains effective when a battle is joined. It follows that the defences of Great Britain by means of ballistic missiles, the static base should be, not to set up enormous and expensive bases on land, but to use the mobile bases provided by ships at sea.

If ballistic missiles are, indeed, being developed without reference to their mobility, it is a major error. The statement in Parliament that a British missile is being studied which will be launched from underwater does not inspire confidence; it does exactly the opposite.

Finally, I would like to carry the argument one stage further. By taking its weapons near to the target the military vehicle improves the effectiveness of new accuracy is now possible in the military vehicle's own vulnerability is increased as it moves nearer to the target. Consequently the closer it goes to the target, the greater the defensive powers it needs.

When it is decided to launch an earth to satellite, all different stages are used in the process of acceleration towards the orbit. Each rocket contributes its bit and is discarded until finally the "payload"—the instrumented satellite— completes its journey to the orbiting range. It could be fanciful to see a similar staging process in the employment of rocket weapons. The initial stage of the journey to the target would be by ship; the second stage would be by ship-borne aeroplane and the final stage would be by ship-borne submarine.

Thus the aircraft carrying the satellite would, in effect, start the weapon on its way and cover some of the distance; the aeroplane would take over and cover more of the distance and, finally, the weapon itself would finish the journey to the target. The ship-borne, missile-carrying aircraft becomes, therefore, a mobile launching platform.

Such ideas must be partly speculative because of the limitations—already imposed by military secrecy. But at least it is known that atomic weapons can be carried by some ship-borne aircraft. And it must follow that they could be fired from a static base. The ship and the aircraft are mobile bases capable of offering a measure of resistance to attack.

OPERATION "POP-UP"—A dummy Polaris intermediate-range ballistic missile rises from the sea near Los Angeles after being fired from a stationary cylinder beneath the surface in a test of the launcher designed for the U.S. Navy's nuclear-powered ballistic missile submarines now under construction.

The U.S. Navy has revealed that it has another new missile near the production stage. Called "Subroc", the weapon will be fired through a submarine's conventional torpedo tubes from beneath the surface at targets 25 to 50 miles away. The Subroc will also rise into the air where rocket engines will carry it to the vicinity of the target, where it will dive and become a homing torpedo seeking its prey. It is capable of carrying a nuclear warhead.

THE NAVY TO-DAY

By DONALD BARRY — in London

The emphasis in all spheres of defence is twofold: to align our forces to the strategy of the nuclear missile age and to make an equitable contribution to the collective defence of the free world.

The combined effect of these twin purposes is to create a situation more revolutionary than military history has recorded and to leave no yardstick by which to measure our national strength. A war of the future could be just as different from the last one as that was from the Napoleonic Wars.

For several years Parliament has been hesitant about committing itself to the full implications of this new order, particularly as it affects the Navy. This year, however, the Government is more specific. In face of Russia's successful launching of artificial satellites and evidence of remarkable progress in rocketry, the Minister of Defence has declared that if Soviet forces ever launch a major attack on the West, even with conventional arms only, the free world will hit back with strategic nuclear weapons.

The West will never start a war of such fearfulness; the aim is to prevent war, with nuclear weapons a deterrent force. The Minister's statement, however, officially reinforces the accepted belief that in a global war of the future the ultimate weapon

STRENGTH OF THE R.N. FLEET

(Estimated strength during the coming year, excluding Commonwealth strength)

<table>
<thead>
<tr>
<th>TYPE OF SHIP</th>
<th>In Reserve</th>
<th>In Commission</th>
<th>Under Construction in the U.K.</th>
<th>Ordered</th>
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<td>1</td>
<td>1</td>
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<td>7(a)</td>
<td>8</td>
<td>15</td>
<td>3(d)</td>
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<tr>
<td>Cruisers</td>
<td>1(c)</td>
<td>2</td>
<td>3(g)</td>
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<tr>
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<tr>
<td>Net Layer</td>
<td>1(b)</td>
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<tr>
<td>Destroyers</td>
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</tr>
<tr>
<td>Fleet Support</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note (t).—"Fleet Support" covers ferry carriers, destroyers and submarine depot ships, R.A.S. ships, repair ships, submarine rescue ships, controlled minelayers, boom defence and degaussing vessels. It does NOT include Royal Fleet Auxiliary tankers, supply ships, tugs, motor launches, trawlers and many harbour craft.

July, 1958
would be the nuclear-armed ballistic missile, with conventional weapons having a designated place in the scheme of things.

It is now evident that the Navy will have an important role within this new strategy. In view of the potential of the nuclear-propelled missile-firing submarine the striking power of the Navy in future is likely to be equal, if not superior, to that of the other Services.

The development of the Polaris ballistic missile by the United States has had a salutary effect on political thought. This weapon, with a megaton warhead, will be effective when launched from a submerged submarine and it appears likely to defeat any defensive measures so far visualised.

The recent voyage of the U.S. nuclear-powered submarine "Nautilus" beneath the polar ice-cap has also had an alarming effect, proving the possibility of operating in such latitudes and of firing missiles through crevices in the ice. The strategic vulnerability of submarine Polars would be incalculable, particularly as they would be able to carry more than 20 such missiles with about 100 warheads each.

From the British point of view, in particular, it would be logical to have a sea-based deterrent such as Polaris. It is not to be expected that in the future the United States will be able to limit its missile development to land-based sites. The submarine launching of missiles is, in fact, an obvious method of expansion. The development of the Polaris missile represents a decided challenge to the Royal Navy and indicates the necessity for a sea-based deterrent. This would appear to be the logical way to have a sea-based deterrent against the threat of Soviet submarines. It is only too likely that this theme will be discussed in the future - a theme which, it is to be hoped, will be given the attention it deserves.

The Government, acknowledging the importance of this development, has been forced to consider how the Royal Navy can be strengthened. The increased possibilities of the submarine with Polaris propulsion make it necessary for the Royal Navy to develop a new role for its submarines. The development of Polaris also means that the Royal Navy must now be prepared for a new role - a role which will be more effective when the United States has a nuclear deterrent.

The development of the Polaris missile has forced the Royal Navy to consider its future role. The Royal Navy must now be prepared for the new role which will be played by the submarine with Polaris propulsion. This role is likely to be that of a deterrent against the threat of Soviet submarines.

In the present situation, it is necessary for the Royal Navy to have a sea-based deterrent. This is the only way in which the Royal Navy can be effective against the threat of Soviet submarines. The Royal Navy must now be prepared for a new role - a role which will be more effective when the United States has a nuclear deterrent. The development of Polaris also means that the Royal Navy must now be prepared for the new role which will be played by the submarine with Polaris propulsion.

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Though rockets had been known at least since 1232 A.D., the first serious scientific work with them did not begin until 1909, when U.S. physicist Robert H. Goddard began experiments to explore extreme altitudes.

Responsibilities in the Atlantic Alliance and the Far East of Suez, to enable Britain to discharge her obligations to S.E.A.T.O. and the Baghdad Pact Alliance and to fulfil her own military commitments in the area, are more important than at present deployed will be than at present.

The Commando carrier will enable the Royal Marine Commando force with sufficient stores and fuel to support the Commando in operations ashore and with helicopters to land men and their vehicles and re-embark them speedily if necessary. The “bulwark” will be the first Commando carrier and she is to be fitted out for the task of returning from a tour of duty in the Far East. The Commando carrier will enable the Royal Marine Corps to act as a “fire brigade” alert and ready at very short notice to smother hostile incidents in remote parts of the world: incidents which might otherwise blaze into full-scale warfare.

The three conventionally armed “Tiger” class cruisers will be in service long before the new missile carriers. The three “Blake”, “Lion” and “Tiger” are now nearing completion, and the first one is expected to be finished by the end of this year. They will be fine ships with the most modern quick-firing guns. But the cruiser situation is disturbing.

There is news of the intended wrapping of five more ships and a recent admission that the cruiser programme is diminishing and none is being built. There are 24 in the operational Fleet, including four of the “Daring” class ships now classified as destroyers, 15 “Battle” class, one “Destroyer” and six “C” class. In reserve are 15 “C” class ships and 50 more and two are engaged on training or trials duties. It is surprising that this class of ship, which played such an important part in many actions of the last war, is receiving little attention.

For the reasons explained in the earlier paragraphs of this article, the submarine will undoubtedly be the most important class of ship played. It is to the submarine programme to which most of the forces of the anti-submarine frigates, such as H.M.S. “Salsbury”, will be of considerable importance.

For the anti-submarine frigates, the main defensive punch of the Fleet will come from guided missile ships, four of which have been ordered. They will be armed with the ship-to-air guided missile Seaslug, but in view of a statement that Seaslug may be capable of being adapted as a ship to ship weapon, this may also have a very significant offensive role. The “Cumberland”, “Hampshire”, “Devonshire” and “Kent” — as the four ships have been named — have been discussed in Parliament for three years and have at last been ordered. But there is still no news of the laying of any of their keels.

Further carriers similarly employed when necessary could be a most valuable adjunct to Britain’s strategic reserve and for dealing with the air threat. The primary function of the Royal Marine Commando forces is to take over from the new cruiser programme the anti-submarine role. The Navy’s anti-submarine forces are diminishing and none is being built. There are 24 in the operational Fleet, including four of the “Daring” class ships now classified as destroyers, 15 “Battle” class, one “Destroyer” and six “C” class. In reserve are 15 “C” class ships and 50 more and two are engaged on training or trials duties. It is surprising that this class of ship, which played such an important part in many actions of the last war, is receiving little attention.

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The Royal Navy is not in the race and the Russians are believed to be a few years behind the Americans.

At the time Admiral Rickover, U.S.N., designer of the “Nautilus”, visited London recently there were rumours that the “Dreadnought” project was to be abandoned, but this has since been officially denied. A considerable amount of experimental work has been done in association with the Atomic Energy Authority, and a zero energy reactor, known as Neptune, is operating.

From the behaviour of this reactor scientists are working out the basic problems connected with a high pressure water-cooled reactor. At Dounreay, in Scotland, buildings are being erected to house a prototype plant and elsewhere the “Dreadnought” is being designed.

With the relaxation of American plans the Royal Navy is in the past and the American’s have been under one heading and in these areas two carriers are to be maintained with two carriers, destroyers, frigates, submarines and supporting units. This will not necessarily be a fully balanced all-purpose fleet, one competent, with maritime aircraft of the Royal Air Force, of making an effective contribution to the combined forces of the Atlantic Alliance. The carriers will be predominantly equipped with anti-submarine aircraft and helicopters, but with fewer fighter and strike aircraft than is customary.

East of Suez, to enable Britain to discharge her obligations to S.E.A.T.O. and the Baghdad Pact Alliance and to fulfil her own military commitments in the area, are more important than at present deployed will be merged into a balanced all-purpose Fleet. This will include one aircraft carrier with a balanced complement of strike fighter and anti-submarine aircraft, a cruiser, destroyers, frigates, and smaller vessels with support units.

This fleet will also ultimately include a Commando carrier, a ship converted to accommodate a Royal Marine Commando force with sufficient stores and fuel to support the Commando in operations ashore and with helicopters to land men and their vehicles and re-embark them speedily if necessary. The “bulwark” will be the first Commando carrier and she is to be fitted out for the task of returning from a tour of duty in the Far East. The Commando carrier will enable the Royal Marine Corps to act as a “fire brigade” alert and ready at very short notice to smother hostile incidents in remote parts of the world: incidents which might otherwise blaze into full-scale warfare. This will be a task in the modern style, ideally suited to the traditionally adaptable Corps of “sea-soldiers”.

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In February, the Fleet Escort "La Bourdonnais" and the fast escort "L'Agenais" returned from a month's cold weather trials in Newfoundland and Canadian waters, designed to test the behaviour of ships of these two classes in cold weather. The results were very satisfactory, temperatures down to minus 22 degrees Centigrade being experienced with continual heavy seas. After her return from this cruise, "La Bourdonnais" was accepted into service.

OBSOLETE WARSHIPS

The phenomenal rate at which modern developments are making warships obsolete—a continual concern of the Royal Navy—is also a factor which is exercising the attention of other Navies of the world.

More than half of America's Navy will be obsolete this year. Admiral Burke, the U.S. Chief of Naval Operations, is reported to have told the House of Representatives Appropriations Sub-Committee that the Navy expects in future to include about 150 ships with nuclear power, surface to air missiles in about 200 ships, and anti-submarine missiles or anti-submarine aircraft on board nearly all combatant ships.

"MAIDSTONE'S" RECORD

When H.M.S. "Maidstone," one of the oldest ships in the Navy, returned to Portsmouth after taking part in the Home Fleet cruise to the West Indies, it was the "seraph" which put enemy lines of communications under a barrage of shells and torpedoes or anti-submarine aircraft.

One of the most famous of the submarines mothered by her was the "Deep," which put General Mark Clark ashore near Algiers to contact French authorities before the North African landings.

The "Maidstone" was visited by Sir Winston Churchill, in 1944, and shortly afterwards she left for the East Indies and the Pacific to take part in the war in the Far East.
STORMS and heavy seas last month brought tragedy and damage to Sydney yachtsmen.

On June 30 one of Australia's best-known yachtsmen, Mr. Ronald Robertson, 55, was lost overboard from the yacht Kurrewa IV in mountainous seas three miles off Sydney's North Head.

Mr. Robertson was sailing master of the yacht, which he was bringing back to Sydney after taking part in the Cruising Yacht Club's annual race around Bird Island.

The picture above shows Kurrewa IV limping into Watson's Bay, Sydney Harbour, to land two members of the crew who were injured about the same time that Mr. Robertson was swept overboard by a wave which engulfed the yacht.

The seas were so great that the pilot steamer, Captain Cook, which put to sea to reach Kurrewa IV, had to give up the attempt just outside the heads.

The crew of the yacht had spent an hour searching the area for Mr. Robertson, but with their sails in shreds and the heavy seas breaking over the yacht they had to seek shelter.

The 57-ft. cutter Solo was forced out of the Sydney-Noumea yacht race last month when a 50 m.p.h. squall snapped the boom and almost capsized her. The photo shows the broken boom after the cutter was returned to Sydney under power. "The boat lay over more than 45 degrees," said her owner-skipper, Mr. Vic. Meyer.
A satellite in a 300-mile orbit circles the earth approximately every 90 minutes and has a lifetime of perhaps some years.

If the orbital height were only 200 miles instead of 300, the air resistance would cause the satellite's lifetime to be only 15 days.

At a height of 100 miles it would not complete even one circuit of the earth. This is because of the air density.

At a height of 500 miles each cubic inch of space through which the satellite passes contains only one-millionth of one-millionth of the amount of air in each cubic inch of air at sea level.

The satellite circles the earth every 90 minutes, which means that the satellite collides with three ten-thousandths of an ounce of air in every circuit.

It would, perhaps, seem natural to think that the air resistance involved, although very small, will cause a very gradual slowing down of the satellite. But you will probably be surprised to hear that it effectively causes the satellite to speed up, not slow down, and yet Newton's Laws of Motion are not violated.

The apparent anomaly is explained by the related mathematical fact that the speed in a circular orbit is inversely proportional to the square root of the radius of the orbit.

This simply means that if we reduce the radius of the orbit the speed will increase at the lower height.

A satellite in 300-mile orbit could be about 200 miles, while the greatest distance could be about 1,500 miles.

Even at these great heights the resistance caused by sparsely distributed air molecules is sufficient to affect the satellite; very gradually, it spirals into the atmosphere — its lifetime of circling coming to a fiery end.

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FIGHTING SAILOR


Captain Bush's delightful and well-illustrated book kept me enthralled. Written with kindness, humour and generous understanding, it is one of the most agreeable volumes of naval reminiscence I have read. I do not wonder it has a "Book of the Month" quality.

Bush was later one of the Naval Assault Commanders for the landings in Normandy, and afterwards commanded the "Malaya" while bombarding in the same area. He ended war service Chief of Staff to the Flag Officer Force "W" engaged against the Japanese on the Arakan coast of Burma.

His last appointment before retiring in 1948 was in command of the "Ganges", the Bombay Training Establishment at Shotley.

In all, during the war, Eric Bush was awarded the D.S.O. and two bars. Since a bar to the D.S.O. indicating a second award was established in 1918, two bars have been granted to no more than 152 officers of the Fighting Services; and three bars to 17.

This record of a gallant seaman is pleasantly and modestly written, and above all shows his intense pride in his chosen service and in his concern, respect and affection for those with whom he served, officers and men.

"Bless Our Ship" is greatly to be commended.—T.Brill.

COMMERCIAL RAIDER

"Lonely Command". By A. A. Hoehling. (Cassell, 15/-.)

The exploits of the German cruiser "Emden" during the First World War are largely forgotten now, and Mr. Hoehling has done us all a service in re-creating her adventures to our mind. That her brief career was spent in the somewhat unheroic and unenlightening occupation of commerce raidering is no reason for failing to recognise the immense amount of trouble which she caused before she was finally brought to book.

Mr. Hoehling has written this book with much zest and verve, and has extracted the last ounce of excitement out of the story.

Some of his descriptive writing lacks rather a less of a nautical flavour than one might expect in a book of this description, and one suspects that the author has little knowledge of warships and the life aboard them. Yet he has managed to write a lively and interesting story, and his description of the "Emden's" last fight with the "Sydney" off the Cocos-Keeling Islands is a vivid one.

Although the book, looked upon in the light of a contribution to the naval history of the first World War, must be considered lightweight, it is yet a very readable account of a remarkably successful ship. —R.T.

A GERMAN HANDBOOK

"Weyers Flottenatlasbuch, 1958". (J. F. Lehmanns Verlag, Munich, 62 DM.)

This highly condensed and well illustrated 185-page record of the world's warships, which first appeared in 1936, is now in its 40th edition—and if Korv-Kapitän Bruno Weyers could see how splendidly his original "Taschenbuch" has developed he would, indeed, be pleased.

Its outstanding feature is, of course, the wonderful all-figures scale silhouettes which are the main means of identification. There are also a wide range of photographs of pocket-book size, but these are mostly of less than an adequate size to convey the splendid portraits which are absolutely correct down to scuttles.

The text is a triumph of compilation condensation whose pages must be a night-mare to both editor and typesetter, and the pages of class pendant numbers with their minuscule action runs to 11 closely set four-column pages—render recognition easy when the ship's number can be seen.

For those who would turn to a reasonably priced naval handbook this little manual will be welcome. The German text does not prove much of a drawback, and the metric system is covered by the conversion lists at the end.

It is compiled by Alexander Bredt with silhouettes by Erich Groner, whose names guarantee accurate and painstaking work. —O.P.

SURVEYING THE WORLD

"Challenger", the Life of a Survey Ship". By Captain G. S. Ritchie, D.S.O., R.N. (Mollis and Carter, 30/-.)

The story of the Surveying Service, that branch of the Royal Navy which is responsible for charting the seas all over the world, could never be dull; and since the surveyor is a man of much knowledge of oceanography, except on the part of one large "mammie" who loudly exclaimed, "I don't mind; I'm not like you common women — I wear drawers".

"I am so glad", says Vice-Admiral Sir Guy Wyatt in the preface, "that Captain G. S. Ritchie has written this book", a sentiment which many others will echo.—H.B.

POTTED HISTORY

"The History of the British Navy". By Michael Lewis. (Pelican Books, £1 6s. 6d.)

To compress the history of the Royal Navy within 274 pages of a Pelican Book is a tremendous task, however ably the historian may set about it. I have no space to discuss this book, which Professor Lewis gives to the story in the most satisfactory manner.

The straight history of the Royal Navy, its world-wide operations, its victories, its defeats, is a much-told tale. But far more than that is needed if the story is to take its place in history.

It is not so much the "what" of naval history that matters as the "why", and it is the political and diplomatic background of the time that alone can bring the naval story into true perspective. And at this, Professor Lewis is a past-master. He has the knack of words, of those deli, illustrative touches which can illuminate the "why" in a vivid little picture.

There are a few small errors of fact, but none so important that it blurs the clarity of his story. Indeed, for the hurried reader who has not the time to spend upon such historians as Corbett, Richmond, and Mahan, this is a great triumphe of naval historians in the grand manner. Lewis's little book is the answer. It is truly in compression such as this there is over-simplification, but none the less the picture which emerges is satisfyingly complete.—A.J.T.
THE UNLUCKY FRIGATE

By KEN LOMAX — in London

Fortunately she had not sunk — they were tough, these trigers in spite of their slender lines and thin plating — and she had been towed by another two anchors to an anchorage in Swansea Bay.

It seemed as though her long peril had been ended, the other ship passed on her way over the war-torn oceans; but the gale had blown up suddenly and the Cheboque began to drag her anchor. The wind howled out of the south-west, playing with the helpless frigate like a cat with a mouse, and she sent out a call for help.

Gammon thought of the men to his right, so smothered in the seas that it was almost impossible to see her. She was close to the bar and the coxswain could see that her stern was already aground. He switched on the searchlight and played it through that surf. As Gammon gazed at the wreck he realised that there was only one way — he would have to take the boat in.

He spun the wheel in his hands and brought the boat alongside the wreck and headed for the surf. He saw the startled looks on the faces of his men as they realised what he was about to do. But they had been grimmned at the thought of the death of the men that none of the men would be washed out of her in the heavy seas.

They had to return to The Mumbles against the full force of the gale, and Gammon had to nurse the boat all the way alongside the shipwrecked crew to safety. It took them one and a half hours to complete the rescue.

Their reward was a message sent by the flag officer-in-charge at Cardiff: "Please convey to the Cheboque's owners a message of appreciation of what I was not 5000 h.p. each; she can make 138 feet long and displacing 140 tons—about 10 tons more than our "Bold" boats—and carrying a 40-mm. gun fore and aft in a rooey gunhouse with four 21-inch torpedo tubes. Powered by four Daimler-Benz diesels of 5,000 h.p. each she can make 42 knots.
BIG R.A.N. SURVEY JOB NOW IN PROGRESS

One of the most extensive hydrographic surveys ever undertaken by the R.A.N. is now in progress between Darwin and Timor.

The area covers 9,600 square miles, in which are included the dangerous Sahul Bank and a vast number of shoals.

Ships engaged on the survey are the frigates Swan and Warrego and the minesweepers Fremantle and Cootamundra.

Acting-Commander J. H. S. Osborn, captain of the Warrego, is in charge.

The R.A.N. expects the survey to be finished in mid-August.

The survey is part of the Navy's long-term surveying program. For many areas around the Australian coast the only detailed charts available are those prepared by Captain Matthew Flinders and other early surveys.

So far as is known the Sahul Bank, which has not previously been surveyed, extends from 160 miles north-east of Darwin to 50 miles south-east of Timor.

It is believed to consist of shoals, banks of sand, and coral outcrops covered by water varying in depth from 50 to 96 feet with a general depth between 210 and 560 feet.

The shoals and banks rise abruptly near the 100-fathom line, which runs approximately parallel to the southern coast of Timor at an average distance of 80 miles.

A depth of only 30 feet was reported in 1915 in a position about 118 miles south-east of the south-western extremity of Timor, and four years later a coral shoal at a probable depth of less than 30 feet was reported about 15 miles north-east of that position.

Because the Sahul Bank has not been surveyed, "The Australian Pilot," issued by the Hydrographic Department of the Admiralty, warns all vessels navigating in its neighbourhood to proceed with caution.

The survey of this area has become necessary because of the increasing volume of shipping traffic that now passes between Australia and South-East Asia.

Canadian Escort

The destroyer-escort "Huron" has undergone a major refit and re-commissioned. Ships formerly classified "frigates" have been re-classified as "frigate-escorts."

The anti-submarine frigate "Beacon Hill" has been modernised after paying-off in January, 1951, and re-commissioned. The "New Waterford" has also re-commissioned after modernisation by Yarrows at Esquimalt being the last of the 21 frigate escors to be rebuilt and re-armed.

THE NAVY
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.

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An Historic Voyage

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The extraordinary feat of the U.S. atomic-powered submarine Nautilus in navigating under the Polar ice cap will go down as one of the great voyages of history.

In this age of astonishing technical and scientific achievement it rivals—and, according to some opinion, eclipses—the Soviet and U.S. successes in putting artificial satellites into orbit around the earth.

Of more immediate significance is the emphasis which the voyage of the Nautilus has placed upon naval power.

Those who only a few years ago wanted navies scrapped as being obsolete in view of the vast progress made with aircraft and the emergence of atomic weapons must now realise that sea-power is far from a spent force.

Just as ships moved from sail to steam they are now moving into the phase of atomic propulsion.

Large, fast submarines with almost unlimited under-water endurance are now seen as the fleet of the future.

Similarly in weapons, the big guns of the battle fleet have given place to guided missiles, fired from surface ships or from submarines deep below the surface.

The navy of the future will thus retain the mobility, flexibility and fire-power which have been its traditional qualities.

The move to under-water atomic-powered vessels is also becoming evident in merchant ship planning.

News from England tells of a proposed 80,000-ton under-water tanker.

The English Mitchell Engineering Group, according to its managing director, has given the "go ahead" to Saunders Roe Ltd., to begin work on the second phase of preparations for the building of this giant submarine.
BASCULE OF NEW SPIT BRIDGE WAITS TURN

It is most gratifying to day to be able to record that there is growing public appreciation of the seriousness of the subject of flags of convenience. For some time leaders of the shipping industry had the impression that when they raised the matter they might just as well have been crying in the wilderness.

In both Houses of Parliament (U.K.), in the Press, and in broadcast and television programmes the existence of flags of convenience fleets and their significance to a traditional maritime nation such as ours have been analysed and discussed.

We, that is, the shipping industry, now know that there are many men and women in the country who are not indifferent to the threat posed by these tax-free fleets to the prosperity of our great Merchant Navy.

We know, too, because we have lost no opportunity of telling them so, that the Government are aware of the facts of the case.

Let me briefly review just what the facts are.

Fifty years ago we owned half the shipping in the world. Today we own only about one-fifth. Other countries have developed their fleets at a much quicker rate than we have—one of the consequences of the war—and some have started mercantile marines of their own without regard to economic considerations or to the shipping services already available.

But even after two World Wars the British Merchant Navy remained fairly constant in size once it had re-established itself after appalling losses. The total tonnage may have varied from year to year, but it must be remembered that new ships are invariably an improvement on those they replace, so that either because of larger size or greater speed their cargo carrying capacity is often increased.

Since the Second World War, in particular, British shipping has had to face the competition not only of the "traditional" maritime nations—which, of course, is fairly and squarely accepted—but also from foreign rivals who have registered their ships in countries which have no geographical or traditional claims to be maritime nations.

These operators derive great advantages from flying the flags of Panhonian countries, because of their virtual freedom from taxation and over the past 10 years there has been an enormous amount of new tonnage which can be and is fairly described as "mushroom fleets".

Taxation in these countries is only nominal and one of the consequential advantages of this is that ship-owners find it much easier to obtain finance for building new ships than does the British ship-owner, subject to heavy taxation and uncertainty from year to year as to what the level of that taxation is to be. These Panhonian countries have no control over the ships registered under their flags—indeed, some of the vessels may never visit the country whose flag they fly. There is no body of maritime law, nor courts, able to enforce such law as is the case in the old-established seafaring nations and these flag-convenience countries contribute nothing to the maintenance of order on the high seas.

In other words, they obtain all the advantages of the freedom of the seas without having to shoulder any of the responsibilities.

Let me give some figures which show the gravity of this phenomenon. In 12 years the fleets of Panama, Liberia, Costa Rica and Honduras (the "Panhonian" tonnage) have grown from 14 per cent. of world tonnage to 15 per cent.—half the total world increase for the same period. In 10 years Liberia, from the barest connection with the tanker market, has developed the second largest tanker fleet in the world.

That is the position the British Merchant Navy has to face. That is the measure of the competition which, if it can neither be checked nor fought on equal terms, may well prove disastrous to the greatest merchant fleet at sea in the world today. I do not exaggerate. We are not an industry merely trying to obtain tax concessions by complaining of foreign competition. What we are trying to do is to establish some means of fighting this competition on an equal footing. You cannot say of "Panhonian" fleets and of the British Merchant Navy that you are all in this together. It would be like matching two
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Giants of the Deep Water

ONE of the most striking developments in merchant shipping since the war has been the phenomenal growth in the size of oil tankers. Pre-war a tanker of 16,000 tons (d.w.t.) was considered a monster. By 1950, the majority of tankers were about this size and there were consignments ranging from 28,000 tons to 30,000 tons. We began calling the latter super-tankers.

Now there are over a hundred such tankers in service and, either aloft or on order, there are some 90 others even bigger, ranging in size up to over 100,000 tons.

Last November the 85,000-d.w.t. Universe Leader entered service as the first of several sister ships. Shortly thereafter, Greek owners placed orders for three ships of 100,000 tons with bulbous bow designs in the U.S.A. and Japan. Then early this year, a further contract was announced for a tanker of 110,000 tons to be built by Bethlehem Steel in America. It is known that this particular yard is already actively engaged in preparing designs for vessels in the 120,000-ton range. A German yard is reported to have received an inquiry from Greek interests in connection with a tanker of 150,000 tons. Italy is reported to have received an inquiry from Greek interests in connection with a tanker of 150,000 tons.

What are the reasons for this rapid growth in the size of oil tankers? The main ones are the great increase in world demand for oil and the change in the pattern of world oil trade which has resulted from the post-war policy of locating new oil refineries in various countries rather than near oil fields.

We can see the manifestations of this policy very plainly here in Australia where oil refining capacity increased from less than 1,000,000 tons in 1951 to more than 3,000,000 tons by 1956.

On a world scale this spreading of refinery capacity has caused a change in the pattern of oil distribution by sea. Now, most of the long distance hauls consist of crude oil, and these are routed through deeper seas, whereas before the war, most of this sea traffic was refined products in much smaller consignments.

Although, of course, costly, a super tanker is a good economic proposition. An 85,000-tonner will cost about 24 times as much to build as an 18,000-tonner but it will carry 4 times as much oil. And not only does the rule apply that the larger the vessel the lower its construction material, propulsive power and crew do not increase in direct proportion to the size and carrying capacity of a vessel but, at an appreciably lower rate. This is particularly true of crude oil carriers. Owing to the uniformity of their cargo, they are simpler in design than tankers which are built to carry a variety of different petroleum products as regular cargo.

The effects of size alone on the unit costs of tanker construction may be gauged from the fact that, at current prices, the basic price of a 32,000-ton crude oil tanker works out at £70 (Sterling) a ton and that of a 60,000-ton equivalent just under £60 a ton.

Almost all the super-tankers in service today were launched less than four years ago and the larger ones are still forced to operate for some of the time at less than their full capacities. They are unable to negotiate fully laden many of the world's sea ways, channels and, in particular, canals. Fully loaded with crude oil, their cargoes trans shipped to smaller tankers for terminal deliveries. Generally, only after a portion of the cargo has been dispensed is a super tanker able to unload at its regular terminal.

The Suez Canal, which is the obvious tanker route for shipments of Middle East oil, can accommodate ships with a maximum draught of up to 35 feet, equivalent approximately to a tanker size of 42,000 tons fully loaded.

Oil shipments from the Persian Gulf area to the Western Powers are bound to continue to increase. It is estimated that 60 per cent of the world's proven reserves lie in this area and the enormous increase in production over the past few years is a forecast of an established pattern of potential expansion.

Up to the time of the Suez crisis most of this oil came through the Canal. Super tankers of 60,000 to 65,000 tons can, in partially loaded condition, traverse the waterway. In fact, a lessening of their load by about a quarter of their capacity, to say about 50,000 tons, would be sufficient to give them the draught to the permissible maximum for safe passage.

In this way a partly loaded 60,000 to 65,000-tonner would be able to carry between 8,000 and 13,000 tons more of oil than the maximum allowed when fully loaded.
through the Canal than a fully loaded 45,000-ton tanker. Furthermore, the tanker could then be sent to an Eastern Mediterranean pipeline terminal for topping up to its full capacity for the remainder of the voyage.

On the other hand, a 65,000-ton tanker can take the longer Cape of Good Hope route and deliver a full load as cheaply as by going through the Canal partially loaded. An 80,000-ton tanker on the same route will realise an appreciable saving in everything except time.

With the seizure of the Suez Canal, control of the most direct water route for oil shipments to Europe and the NATO nations is now in Egyptian hands. This, coupled with existing overland pipelines, right-of-way to the Mediterranean could constitute a serious threat to the whole of Western Europe's and the United Kingdom's industrial activity, which is now estimated as being up to 85 per cent dependent on the expanding oil production of Kuwait, Saudi Arabia, Iran and Iraq.

An economically feasible alternative means of keeping up the movement of vitally needed oil supplies is therefore a matter of crucial importance.

The large number of super-tankers under construction and on order will provide Western nations with such a means. Thus Colonel Nasser's activities and the general unrest in the Middle East have in no small part been directed towards a secure place in the world's future oil fleets for the super-tankers.

The latest analysis of world tanker fleets compiled by the London shipbrocker firm of John H. Scott Ltd. shows that at the end of 1956, the total world tanker fleet comprised 2,862 vessels totalling nearly 414 million tons. Of these, super-tankers in service aggregated 25,569,200 tons and on order 25,690,200 tons. Of the very large tonnage of 960 tankers under construction, more than 120, representing nearly 80 per cent of the total tonnage, are in the super-tanker class. Comparatively few are larger than 50,000 tons and although it might now be desirable to change many of the orders to larger sizes, available berths for such vessels are far short of potential requirements.

All the world's major shipyards are solidly booked up to the early 1960's, so it will still be several years before ships of the 60,000-ton to 65,000-ton size enter service in substantial numbers. And it is crude-oil carriers in this range which are favoured because, as mentioned previously, they have the special merit of being equally useful on a cost per ton-mile basis both for the Suez and the round the Cape routes.

However, cost per ton-mile is not the only factor involved in assessing the comparative advantages of different sized super-tankers. Formidable problems are presented in the handling of such mammoth ships both at sea and in port and in the provision of adequate facilities for berthing or otherwise unloading them.

In Australia, for example, the maximum depth at discharging terminals at Melbourne is 34 feet and at Sydney 30 feet. These correspond approximately to the draughts of a 35,000-ton and 40,000-ton tanker respectively. The Kwinana jetty can take tankers up to present maximum of 52,000 tons.

Nowhere do we have a dry-dock capable of accommodating a 40,000-ton tanker. This means we will not, in the ordinary course of events, be seeing any tankers in the 60,000-ton and above range here for some considerable time.

However, for the purpose of keeping up adequate deliveries of crude oil from our present area of supply in the Middle East, and Far East, tankers of a size we can comfortably handle with existing facilities are perfectly suitable. This could only change radically if Australia became a major theatre of war.

Thus Colonel Nasser's activities and the general unrest in the Middle East have in no small part been directed towards securing a place in the world's future oil fleets for the super-tankers. By the end of 1958 there will be two more in Venezuela and by the end of 1959 another in Indonesia.

As for discharging terminals, the only ones currently available for this size of tanker are San Francisco and El Segundo on the U.S. west coast and Halifax, Nova Scotia.

However, extensive improvements are planned for a number of ports in other parts of the world, including Le Havre, Sete, Fauley and Milford Haven in Europe and the U.K.; at Shimitzu and Wakayama in Japan; at Baratang in the Andaman Islands; at Rio de Janeiro, and at Poquet Sound, Huntingdon Beach and Delaware Bay in the U.S.

Very few of the ports mentioned could handle 80,000-ton to 100,000-ton tankers and the conclusion reached in the N.P.T. study is that a great deal of work is required in the development of ports. In particular, this includes dry-dock and repair facilities adequate for such giants which will become necessary if they are to be operated efficiently.

Reducing the draught of super-tankers by pumping a portion of their load into lighters prior to entering port is not a generally suitable practice in north-west Europe or any other locality subject to big tides, frequent bad weather or both.

Unloading and loading at sea through submarine pipelines is, however, a development of considerable promise and much valuable work is being done to improve the techniques involved in this alternative method of handling super-tankers.

Whatever the problems involved in the advent of the large super-tanker, no effort will be spared to solve them. A measure of the importance of assuring by every possible means safe and efficient transportation of oil from the producing areas to the world's refineries, can be gauged from the fact that on any average day some 12 million tons of oil valued at roughly $100 million are at sea. Oil is far and away the world's most valuable seaborne cargo.

— From "Petroleum Gazette"
**P.G.O. GETS AWARD FOR REPORT**

The P. & O. Steam Navigation Company has been awarded one of two annual trophies presented by the English weekly magazine “The Accountant” for the Company’s annual report for the year ended September 30, 1957. “The Accountant” has made these awards since 1954 for the most informative set of accounts issued each year, one for large companies, the other for smaller concerns, except less complex reports, but both equal in rank. The P. & O. Company has been awarded the 1958 trophy for the first category. “The Accountant” awards are made by a panel of judges, mainly qualified accountants, who attach particular importance to the adequacy of the information given and to the way in which it is presented. The aim of the P. & O. report was to provide information on the Group’s activities in an attractively illustrated layout, which gives clarity to the many details included.

It is of 40 quarto pages, printed in two colours, with a number of graphs, tables and halftone illustrations.


The award takes the form of a pair of hand-made silver wall sconces inscribed with the name of the winning company and specially designed with ancient and modern symbolism depicting commerce and accentuity.

**Whaling Now Big Industry**

The Minister for Primary Industry, Mr. William McMahon, said recently that the 1958 Australian whaling season, which opened in June, was off to a good start and that results to date indicated another good season was likely.

Mr. McMahon said: “The shore-based whaling industry in Australia has now entered its tenth year of operation. In that period it has contributed substantially to the economy of our country. The whaling stations provide seasonal employment for a considerable number of skilled and unskilled workers on the Australian east and west coasts and at Norfolk Island. They produce whale oil mainly for export and meat and solubles for use as stock feed in Australia and for export. The assets of the industry are valued at approximately £2 million and the annual average product of the industry exceeds £2 million, of which over £1,800,000 represents earnings from whale oil exports.”

The Minister said that in the interests of the long-term conservation of whale stocks each Australian station is allotted a maximum annual quota of humpback whales. The 1958 quotas are:

- Nor West Whaling Co. Ltd., Carnarvon, W.A., 1,000
- Gnowangerup Beach Whaling Co. Ltd., Albany, W.A., 120
- Whaler Products Pty. Ltd., Tangalooma, Qld., 600
- North Coast Whaling Co. Ltd., Byron Bay, N.S.W., 120
- Norlisk Whaling Co. Pty. Ltd., Norlisk Is., 129

Mr. McMahon said: “The 1958 Australian mainland stations commenced operations at different times in the month of June. By July the number of humpback whales taken at the various stations was: Tangalooma, 176; Byron Bay, 16; Carnarvon, 29; and Albany, 28.

Mr. McMahon added that a decision of considerable bearing on the future welfare of the industry was taken at the International Whaling Conference in The Hague in Holland recently. A move by some interested countries to permit greater exploitation of humpback whales in the Antarctic by the international whaling fleets was strongly resisted by Australia and was defeated, he said. The Minister explained that the humpback whales which travel the east and west coasts of Australia in season come from the well-equipped international pelagic whaling operators who would seriously menace the future of the Australian industry in a short time.
NUCLEAR PUNCH FOR NAVY

On April 30, the Blackburn NA.39 two-seater, all-weather twin-jet strike aircraft made its first flight at Bedford airfield, England, piloted by 35-year-old Derek Whitehead, an ex-R.N. pilot, accompanied by his flight observer, 12-year-old Bernard Watson, head of Blackburn's flight-test department. At a time when guided missiles are threatening to render piloted aircraft (at least piloted combat aircraft) obsolete, the NA.39's first flight may not appear to be a particularly thrilling item of news. But there is good reason for the Silent Service to be, if not thrilled, at any rate quizzed at the prospect of operating in two or three years' time the first squadron of NA.39 strike aircraft. And the good reason is this: the NA.39 packs a nuclear punch and is the Royal Navy's first supersonic fighter. It can carry a variety of nuclear weapons inside its bomb bay, and in place of these can certainly carry, either in the bomb bay or from pylons under the wings, a wide variety of rocket projectiles and bombs. Perhaps it can carry torpedoes of the latest type which home on to their targets; perhaps it may eventually carry air-to-surface missiles.

But at present, at it only to be expected of such a new and formidable aircraft, practically everything about the Blackburn NA.39 is secret. It has not even got a name; the number by which it is known is actually that of the Admiralty specification to which it was designed. But "Buccaneer" might well be a good name for the NA.39, for its task is to strike quickly, doing the maximum amount of damage to its target, and escape without detection. Dropping an atom bomb on an enemy task force or harbour may seem very unromantic when compared to Sir Francis Drake's famous sea raid on Cadiz in 1587, in which a large quantity of stores and ships for the Spanish Armada were destroyed, "singeing the King of Spain's beard" as this exploit was called. Yet raiding an enemy harbour would be just the sort of task that a Blackburn NA.39 squadron might be called on to undertake, and it is rather interesting to think that the cost of deleting the Spanish Armada (quoted by Sir Winston Churchill in A History of the English-Speaking Peoples) — reckoned to have been about £160,000, and that a single Blackburn NA.39 would cost perhaps as much as three times this sum! This does not mean that the NA.39 is more expensive than it ought to be, but that any modern military aircraft — especially a supersonic one — costs a lot of money.

There are several reasons why an aircraft like the NA.39 is not cheap. For one thing, it has to be immensely strong to be able to withstand the hard usage imposed on it by landing and taking off from an aircraft carrier and — more especially — to manoeuvre at supersonic speed. To launch its atom bomb the NA.39 will almost certainly employ what the Americans call the "toss bombing" technique. In this method the aircraft approaches its target at high speed and at a very low altitude to avoid radar detection. At the critical moment the pilot pulls up into a half-loop, releasing his atomic weapon in the middle of the half-loop, in effect "tossing" it on to his target, since the speed imparted to the weapon by the aircraft's own speed would be considerable. The pilot completes his half-loop and rolls off the top, heading back in the direction from which he came, thus avoiding being "bounced" by enemy fighters and escaping the effects of an atomic explosion. Some of the R.A.F.'s Canberra bombers have been equipped to make use of this technique, and the NA.39's considerable range and high speed should make it very suitable for this task.

The NA.39 is propelled to supersonic speed by a pair of de Havilland Gyron Junior jet engines: the exact thrust of these units is at the moment secret but each is believed to develop about 8,000 lb. static thrust each. To put it another way, at its maximum speed the NA.39's engines would develop a thrust which, expressed in terms of horsepower, would nearly equal the horsepower of a destroyer's engines at its top speed! The engines are mounted on each side of the fuselage, and one advantage of positioning them close to the fuselage centre-line is that the aircraft will not tend to swing violently to one side if an engine fails.

FIRST OF NEW PILOT VESSELS LAUNCHED
beer in handy cans
FOSTER'S LAGER
VICTORIA BITTER

FIFTY YEARS A BOATMAN
James Hazlett pressed himself further back into the shelter of the wall, his old body shivering from his sodden clothes and the lash of the nor'-nor'-easter. This was one of the worst gales he could remember in all his seventy-eight years, blowing directly on to the shore, sending the seas thundering on to the beaches.

He watched the men in the boat as they hoisted a rag of sail, saw her begin to draw away, sculling swiftly for another attempt with the waves, skids, warps and tackles the man-handled the heavy boat back on to the launching ways, and after three hours of night mare labour she slid into the heaving seas.

"She's all right, be the old boat," decided the watchers. They were drenched to the skin, frozen, their bodies aching with cold and fatigue. "We'll get home for a change of clothes—wells be back afloat when she returns."

But old James Hazlett stayed, watching and waiting. As he had been in the forefront of the battle to get the boat launched, he was fitter than most—and as just as cold; but his years of battling against the seas had fitted him better for his vigil on such a night besides, there were men of his family out there, a son, two grandsons and a grandson.

He saw the coxswain bring her up to the shelter of the wall, and the men from the shore—tackled the capsize craft and ran it on to the beach in readiness to make another attempt later. The boat was once more towards the shore, running down to come round again. But this time as he watched he saw her breakers. The breakers and waves bouncing off the beach must have caught her again, pulling her from coming round. He saw the coxswain lay his miser azen back and put the helm up so that she would pay off and gather more headway for another attempt; but again she missed stays and it was obvious now that the coxswain could not avoid being driven ashore.

As soon as the coxswain realised what had happened he ran down the sails and put the helm up to the port tack, the boat would run bow on to the beach; but just as they were running true for safety a breaker caught the lifeboat under the bow and slaved her on the beach. In an instant she capsized, rolling over on the wave; the watchers gathered around to watch her slide into the water a heavy and another victim; and as the Hare of the sandbank where the Hare of the sandbank where the boat slid into the water and missed stays and it was obvious now that the coxswain could not avoid being driven ashore.

But the heavy seas were roaring round the bottom of the boat, the seas were blowing over the boat; the skids, warps and tackles the men hand-hauled the heavy boat back on to the launching ways, and after three hours of night mare labour she slid into the heaving seas.

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James Hazlett turned as footsteps scraped on the stones and he saw the figure of his youngest grandson staggering towards him from the cottages, his freshly clothing already wet from the spray. "Better go and get a warm and change, hadn't you."

"Hazlett shook his head.

"Time for that when the boat gets back. They'll be having a fair tussle out there and they'll want your help to bring her in."

"Mebbe so; but I still reckon you ought to go. There'll be time enough before . . . Listen! Don't just sit there.

Straining their ears they could hear faint sounds borne on the wind, then louder, and they drew near, heeded by the steady fall of the boat. It was the sound of rain pattering on the deck; then the sound of the sea's coming round the bottom of the boat, and the sound of the waves driving over her. Then the coxswain brought her up to the wind to just the position which had not been set up to now; then, satisfied that all was as it should be, he brought her round to the starboard tack and stood towards the shore. Then again round to the other tack to make another leg towards the wreck. Hazlett watched these manoeuvres with approval in his sea wise eyes. He saw the boat not making much headway on the new course, stand once more towards the shore, running down to come round again. But this time as he watched he saw her breakers. The breakers and waves bouncing off the beach must have caught her again, pulling her from coming round. He saw the coxswain lay his miserazen back and put the helm up so that she would pay off and gather more headway for another attempt; but again she missed stays and it was obvious now that the coxswain could not avoid being driven ashore.
REVOLUTION COMING IN SEA TRANSPORT

THERE is every indication that a revolution in sea transport is on the way. Many factors need intensive study by the British shipbuilding industry, but the disturbing thing is that while there is perhaps adequate research on most of the more immediate technical problems, there seems to be a serious lack of fundamental long-term research, both technical and operational.

Ships have been basically the same for donkey's years. The most daring innovation has been to place the machinery at the stern, leaving the forward part of the ship for passengers. But even this move has been sternly resisted by many companies.

Nuclear propulsion will offer opportunities for rethinking the whole approach to maritime transport. For instance, it might be very useful to separate the nuclear-power unit from the cargo or passenger container — in other words, to have a very powerful nuclear tug, which would tow ocean-going barges from port to port.

A nuclear-powered tug could afford to be extremely large — perhaps surrounded by big buoyancy tanks to make it virtually unsinkable. It could arrive at a port, dump its barges, and be off an hour later with a new lot in tow. It would need to refuel only every few months.

Again, there is growing interest in hydrofoil vessels. These have underwater “wings” fixed on to the hull by struts. Above a certain speed, the body of the craft rises out of the water, leaving only the foils to support it. It may be the answer to a long-term solution to the problem of fast transport. At sixty knots, and even 1,000-ton hydrofoil cargo vessels for very high-speed marine transport, have been seriously suggested.

—From “Petroleum Gazette”

LEARNING TO SWIM AT SEA

Six voyages from England to Australia and back examine marine commando Brian Roberts (32), who has taught 85 children to swim.

Brian Roberts is the swimming pool attendant on the P. & O. liner “Strathmore.”

Two of the children not only learned to swim from scratch— they could not swim a stroke when they started the voyage — but in 10 days swam 200 lengths of the “Strathmore” pool, 1,800 yards.

They were Patricia O’Donnell (10), from Northern Ireland, who left the ship when she arrived at Fremantle from England, and the daughter of an Indian Princess, the Maharani of Morvi, who travelled on a previous voyage. “These two were exceptional”, says Roberts. “But I have quite a lot of youngsters swimming in 10 days or less.” He estimates that during his period as pool attendant 500 children have used the pool.
THE world-wide shipping slump, which has led to well over five million tons gross of ships being laid up for lack of employment, and to a doubling of last year's rate of shipbreaking, is beginning to have its effect on the shipbuilding industry, although it will take some time for most of the shipyards to work their way through their existing order books, provided too many cancellations do not take place.

Figures issued by the Shipbuilding Conference for the first quarter of the year show that during this period new contracts for the British shipyards numbered only 711, gross of vessels making a total of 41,000 tons gross. In the same quarter cancellations comprised 39 vessels, totalling 2,553,851 tons.

Much of this work is concentrated in the major ship-building districts, particularly the Clyde, the Tyne, Wear and Tees, and Belfast, although there is a substantial tonnage building in the Liverpool district, in which the principal shipyard is that of Cammell Laird, situated on the Birkenhead bank of the Mersey.

Just over one-quarter of the total production comes from the Clyde, where the world's largest passenger ships, the Queen Mary and Queen Elizabeth, were built at the well-known Clydebank yard of John Brown & Co. Ltd. No large passenger liners, strangely enough, are under construction on the Clyde at present, and the Cammell Laird has had to defer the start of work on the Cunarder which had been ordered as a replacement for the Britannic.

The Clyde order book consists mainly of cargo liners, tankers and ore carriers, although there is also a great variety of specialised work, and much research and experimental work is going on in respect of hull design and machinery development.

The Lithgow group, which includes the Fairfield Shipbuilding & Engineering Co. Ltd., Win. Hamilton & Co. Ltd., and several engineering establishments, is engaged in the construction of a vessel to be propelled by gas-turbine machinery. Much Admiralty work is going on at the same time, and Yarrow & Co. Ltd. is collaborating with the Admiralty in an important research and development project.

Many of the shipyards on the Clyde, as elsewhere, are engaged in long-term improvement and development schemes, costing many millions of pounds, and designed to make use of the latest techniques and modern mechanisation.

Much progress has been made at the shipyards of Bartram & Sons Ltd., for example; and on the Wear at Sunderland the amalgamation of two shipyards into one, that of John Brown & Co. Ltd. and Pickersgill Ltd., has greatly improved the combined output of the two original yards.

As a result of the introduction of new techniques, assisted by the co-operation of the workpeople, Bartram & Sons Ltd. also on the Wear, have recently set a record for a British shipyard by completing the 10,000 tons deadweight cargo vessel North Devon from the launching of the keel to delivery in less than seven months.

Unfortunately in all too many British shipyards the proper use of modern techniques and machinery is being hindered by the failure of the trade unions to co-operate fully. With the introduction of new methods and new materials, work is continually being held up by disputes between different trade unions as to whose members should carry out certain types of work.

Part of the trouble arises from the fact that there are so many different trade unions in the shipbuilding industry, and that the majority of the yard employers are not members of any trade union at all. Inter-union jealousies, and the failure to progress towards the elimination of restrictive practices, are greatly hindering the productive potential of many British yards, whose competitors overseas are more favourably placed.

On the Continent it is unusual to find more than two or three trade unions represented in the shipyards, and the inter-changeability and flexibility of labour exists to a degree unknown in these islands.

As on the Clyde, the order books of North-East Coast shipyards are highly diversified, and include tramps, cargo liners, ore carriers and oilers. A passenger liner of 20,000 tons gross is being built for Portugal by Swan, Hunter & Wigham Richardson Ltd., at Walker-on-Tyne, and progress is being made on the construction of large dry docks for the accommodation of the large sizes of tanker now being built, several tankers of 65,000 tons deadweight now being on order.

There is a growing tendency for British shipowners to order with overseas shipyards from which, in addition to reasonable prices, they can expect prompt and prompt delivery. If the present shipping slump continues for any length of time, competition for the few orders that will be available will be extremely keen.

THE NAVY
August-September, 1956
HISTORIC CABLE SHIP LAYS VITAL NEW LINK

Laid by Britain's Post Office Cable Ship Iris, a new 120-circuit submarine telephone cable between the British Isles and Belgium was completed in 1958. It is the longest cable ever laid between the United Kingdom and Belgium, and it is expected to handle the traffic of up to 1,700 calls per day. The cable consists of a polythene insulated coaxial cable comprising an inner copper conductor made up of a strand of seven wires insulated from the outer conductor by a solid dielectric of polystyrene. Spliced into the cable are three two-way submerged repeaters of the rigid type. Features of the cable are included in a range of momor products which Standard Telephones and Cables Ltd. is showing in the British Industry Pavilion at the Brussels Exhibition.

JOIN THE NAVY LEAGUE

The object of the Navy League in Australia, like its older counterpart, the Navy League in Britain, is to persist by all means at its disposal upon the vital importance of Sea Power to the British Commonwealth of Nations. The League sponsors the Australian Sea Cadet Corps by giving technical training to and instilling naval training in boys who intend to serve in Naval or Merchant services.

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

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

MAY WE ASK YOU TO JOIN and swell our members so that the Navy League in Australia may be widely known and exercise an important influence in the life of the Australian Nation?

For particulars, contact The Secretary, 83 Pitt Street, Sydney, N.S.W. or The Secretary, 443 Little Collins Street, Melbourne, C.I., Victoria

or one of the Hon. Secretaries at:

Box 1441T, G.P.O., Brisbane, Queensland

726 Sandy Bay Rd, Lower Sandy Bay, Hobart

27 Hackett Terrace, Marrickville, S.A.

62 Blenowe St, West Leederville, W.A.

49 Proggall St, Turner, Canbura, A.C.T.

23 The Navy

NATURAL RUBBER IN UNIQUE POSITION

BY JAMES BUSH

Broadcast over Station 2BL, August 1, 1958

The Rubber Research Institute of Malaya has already done some remarkable things towards making each tree produce more and more rubber. But, the long range sales planning it represents.

Today, Natural Rubber is in the unique position of having had for the past several years practically a saturation market. In 1958, its production of 1,89 million tons fell only some 5,000 tons short of the actual Natural Rubber requirements.

In 1957, Natural Production of 1,93 million tons provided only a 50,000 tons surplus over consumption. The surplus for the past several years, however, had been increased to 1,88 million tons. Natural Rubber was selling at a premium over synthetic, and the high-yielding stocks now being planted bring in more and more rubber per acre. The figure in itself is not so important as the long range sales planning it represents.

To-day the world market for rubber (that will forecast) natural will continue to maintain this sales advantage for several years, and possibly longer. At that point, it is conceivable that the polysyrenes and other so-called "synthetic naturals" so much in the news these days—but not necessarily the most competitive—can have reached competitive status in some areas of quality, coupled with production levels that might make possible an approach to natural in price. Also, synthetic, by then, will be established in a number of overseas plants, putting it into production on a world-wide scale.

It is at this point of competition with a full-blown synthetic, that the Natural Rubber industry is to-day aiming its research planning. It is directing its efforts at maintaining at this time natural's currently enviable sales position. The increased funds are an important step at this point in the industry's thinking.

These funds will be used to set up a streamlined research and development plant that will place heavy emphasis on producing a natural that in price and quality will be hard to match. And when natural's scientists will be functioning at broadening the range of their product's applications, so as to keep it up to date—and a bit ahead—of the demand of the market. Get more out of producing unit, and costs go down. The one important point of assuring that rubber will always be price-competitive is to produce more and more rubber per planting. This is where Natural Rubber has a great advantage.

It must be remembered, too, that Natural Rubber production is a regenerative process, and thus has a natural capacity for expansion, whereas synthetic production, for example, never reaches a destructive process, such as the production of synthetic from coal and oil chemicals.

The Rubber Research Institute of Malaya has already done some remarkable things towards making each tree produce more and more rubber. But, the long range sales planning it represents.

The average yield in the British Industry Pavilion at the Brussels Exhibition.

In February, 1958, there took place in Kuala Lumpur, Malaysia, an event directed at giving long-range stretch to Natural Rubber's current status as one of the best selling practical commodities that is selling just about all it can produce.

The purpose of Malaysia's Council of Malaya voted to increase their research and development funds by 2.5 per cent. These funds are collected on every pound of Malayan-grown rubber exported from Malaya. At current rate of export these collections will provide about $35 million Malayan dollars per year.

It is expected that this amount will increase considerably, as tens of thousands of new Malayan acres are opened to rubber production, and the high-yielding stocks now being planted bring in more and more rubber per acre. The figure in itself is not so important as the long range sales planning it represents.

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The average yield in the British Industry Pavilion at the Brussels Exhibition.
Research Institute experiments are going on right now that could well raise even this figure. On the consumer side, Natural Rubber laboratories in England have been experimenting with mixtures that produce a natural-like long wear for soling and other leather substitutes.

In the field of clothing, natural research has produced a non-woven fabric that instead of weaving uses latex to bind the non-woven fabric that instead of natural's research has produced a material that lends itself to automotive uses, and in manufacturing requirements it is expected to meet the varying demands of an ever-changing consumer habit.

One of the first steps in the mechanisation process was the introduction of the huge articulated steel arms of the Chiksan Co.'s hydraulically-powered machinery. These arms, which are now in use at Long Beach, California, are capable of handling 20 tons of natural rubber each hour. They effectively obviate the need for the flexible hoses and their gangs of men. The arms, in batches of five, are operated by one man at a control panel.

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Advantages of the new system, in addition to the quick and easy connection of the discharge system and a high rate of flow, are great reduction in the danger of bursting or thrashing hoses and reduced fire insurance rates.

But there are other problems arising as Australia's capacity to refine its own natural rubber products increases. Already our needs, our export potential and our desire from the producing oil-fields of the world will have forced the use of super tankers on the Australian run.

Broadly speaking, the advantage of super tankers lies in their ability to carry approximately four times as much oil as a normal tanker, but they cost only about twice as much to operate. In Australia, only the Port of Sydney of about 60,000 tons, and it is doubtful whether these wharf facilities within those harbours to enable such super tankers to load.

However, the announcement in March of a decision to erect a refinery at St. Vincent's Gulf, 20 miles south of Adelaide, by the Co-operative Australian Co., could make it unnecessary for expensive harbour facilities to be provided for super tankers. What is envisaged here is the laying of a 14-inch or 30-inch pipeline from the refinery reaching under the sea for a mile to St. Vincent's Gulf.

At this point there is a natural depth of water of 60 feet and so crude oil could be pumped out into the pipeline from a super tanker standing in the roadstead.

This pipeline will be constructed in sections. When the first section is completed it will be welded to the end of the first section and the whole undertaking will be made a little farther from shore. This process will continue until the entire pipeline, contoured to the seabed, is ready for the final resting place in the sea.

The pipeline will be slowly sunk by letting in water and will be anchored in its predetermined position, where it will be anchored with bags of cement and its ends then sealed. Beyond the end of the submarine pipeline, there will be two flexible hoses attached and the discharging tanker, after anchoring and tying up to strategically-placed buoys, will fish these hoses up from the seabed. It is expected a discharge rate of 50,000 tons per day will be achieved by this method.

While the submarine pipeline has its disadvantages, it is almost impossible to reach a large tanker to a stop right on the desired spot in the open sea, so there is usually a delay of several hours for prevailing conditions before dropping his bow anchors and drifting into position by paying out anchor cable.

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mises to make off-shore loading and unloading easier, sale and efficient.

Similar in concept is a loading and discharging platform which has been erected three miles off-shore in the Adriatic Sea. It eliminates a great deal of the jockeying for position necessary when a tanker is using the conventional submarine pipeline. This turret, firmly anchored to the seabed and round in shape, incorporates a battery of hoes all of which will swivel the full 360 degrees while performing the function of either loading or drawing off cargo.

These “floating turrets” allow the tanker to attach itself by hawsers at one point and swing free with the prevailing currents while still discharging, and gives them almost complete freedom of movement.

Speeding the tankers is designed to reduce the cost of the ultimate products of crude petroleum within the reach of the consumer. The 1 million tanker bringing crude from Iran or Indonesia is generally a “one-way” ship. It has the specific job of transporting crude and, therefore, has no chance of any substantial back-loading. So the moment the job of delivering oil is done, it must put to sea again to repeat the process.

In the case of the Persian Gulf run, tanker turnarounds impose a rigid regime on crews whose approximate 18-day voyages back and forth are interspersed with only occasional glimpses of other tankers and oil ports as seen from the decks of their vessels.

This is one reason why tanker crews have the best quarters and best conditions of any afloat. And it is also the reason why most tanker companies follow the practice of allowing three months’ leave every year to the men who speed across the world’s oceans with the fuels for industry and progress.

—From “Petroleum Gazette”.

LET us look at our nearest neighbours in the Solar System. First there is the Moon, 250,000 miles away, a satellite of the Earth. It has no atmosphere, no water, no vegetation, and appears to be a barren stone and completely covered with several inches of dust. On the sunny areas the temperature is that of boiling water, or 212 degrees F., and on the shady areas that of liquid air. A barren inhospitable place to visit, indeed!

Our next nearest neighbours are Mars and Venus, about the same size as the Earth, and rotating about the Sun in the same way as our planet. At their closest points to us, Venus is about 30 million miles away, and Mars about 50 million miles.

Little is known about Venus, since it’s continuously and completely covered by clouds, so we’ve never seen its surface. It certainly has an atmosphere, but it appears to be mostly carbon dioxide with practically no oxygen. It must certainly be hot, perhaps its surface temperature would be a thousand degrees F. closer to the Sun than the Earth is.

Mars, on the other hand, doesn’t seem so inhospitable. It’s further from the Sun than the Earth and, therefore, much colder. At its equator the temperature doesn’t exceed 77 degrees F.

Mars has an atmosphere, though only a thin one. The pressure at the surface is about 1/3 of that on the Earth—it’s the equivalent of travelling in an airplane at a height of 50,000 ft. There appears to be vegetation on Mars, since the dark areas vary with the seasons, and there are polar ice caps, though only a few inches thick instead of many hundreds of thousands of feet thick as at our poles.

Water seems to be very short, as there are no seas, very limited ice caps, and little or no water vapour in the atmosphere. There appears to be no justification for supposing any intelligent beings live on Mars, and the so-called canals which were once thought to be artificial are now known to be less regular and less likely to be artificial than was previously thought.

Beyond these two neighbours, there’s Mercury, so close to the Sun that it’s intensely hot and has no atmosphere. Going away from the Sun beyond Mars we find Jupiter, Saturn, Neptune, Uranus, and Pluto, in that order. All are intensely cold, because of their great distance from the Sun and are covered with miles of ice.

Where they have atmosphere they’re composed of methane and ammonia. To reach Jupiter, Saturn and Uranus is too far away, but to travel from one side of the Galaxy to the other would take 100,000 light years. So it looks as if we must be content to admire the beauty of the Milky Way and confine our space travel to our Solar System, to reach there, only to our immediate two or three closest neighbours, the Moon, Venus and Mars. Of these, only Mars appeals to me for a holiday, and even then I’m quite prepared to give up my place to some more enthusiastic scientific explorer.

No, space travel will really be no picnic.
THE exploration of the Antarctic continent made great progress this Winter. The entire world followed with great excitement the "Conquest of the South Pole" undertaken by the Englishman Dr. Vivian Fuchs and the New Zealander Sir Edmund Hillary, the latter of whom was already famous for having climbed Mount Everest. In order to arouse the interest of men against each other in a kind of "contest", though the truth is that Sir Edmund had merely carried out the orders of the head of his expedition by establishing bases for him. The fact that the New Zealander had done his job and then continued on his way to the Pole, and got there, was of no importance. The two men were not engaged in a match, but were part of an expedition that had a definite scientific job to do.

Sir Edmund and his tour fellow New Zealanders reached the Pole on January 3, 1958, Their British associates, led by Dr. Vivian Fuchs, reached 90 deg. south latitude on January 19. Together they constituted the third expedition ever to arrive there by land, for Hillary and Fuchs merely continued a scientific job to do. Their British associates, led by Dr. Vivian Fuchs, reached 90 deg. south latitude on January 19. Together they constituted the third expedition ever to arrive there by land, for Hillary and Fuchs merely continued a scientific job to do.

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Cook, the first of the pioneers, crossed the southern polar circle and even went beyond 71 deg. south latitude. When one thinks of the sail-boats that he had to use, one can appreciate his courage. Antarctica appeared to him a "universe of horror". His log-book contains the first description ever given of these regions: "Ninety-seven ice-hills were distinctly seen within the field, besides those on the outside; many of them very large and looking like a ridge of mountains, rising one above another till they were lost in the clouds. . . . Such mountains of ice as these, were, I believe, never seen in the Greenland seas. . . . I will not say that it was impossible anywhere to get further to the south; but the attempting it would have been a dangerous and rash enterprise, and what I believe, no man in my situation would have thought of." (Voyage of Captain Cook.)

Cook even notes in his diary that in his opinion one would never venture south again, that no ship would again plough the southern polar seas! Nevertheless, English voyages were resumed. Although it had been given a more precise idea than ever before of the gigantic, the hypothetical Antarctic continent.

It was not until the beginning of the nineteenth century that men again ventured forth on the southern seas. But it was no longer out of disinterested research. Most often they were motivated by the lure of game. The whale and seal hunters thought that the existence of southern lands might mean that there were new and rich hunting grounds. Pushing farther and farther south, they found interesting rocks of ice on the beaches of an archipelago they baptised the South Shetlands. Little by little they extended their field of action and their ravages to the neighbouring islands and to Graham Island, probably without realising that they were on a peninsula of the Antarctic continent. During the same period, the Russian Otto von Bering, on the ice-ship "Vostok", navigated the southern polar ice-cap for the first time (1819-1821). The English Captain Weddell sailed as far as 78° 25' south. In 1810, the Frenchman Dumont d'Urville touched upon a coast which he named after his wife, Adèle. He was the first to set foot in Antarctica. The American Wilkes also contributed to our knowledge of the southern continent. Finally the Englishman Ross sailed along the hundreds of miles long wall of ice that constitutes the barrier of the same name, to Victoria Land, more than 180 miles from the coast, and also to the 86th parallel, on the ice-bank that covers Ross Sea, of which the barrier is only the shore. Another Englishman, Shackleton, fought the first battle against the Pole itself.

After wintering on Ross Island, he and three companions headed due south along the Ross ice-bank. The sleds, which were drawn by Manchurian ponies, were piled high with a three-month's food supply. On January 9, 1909, Shackleton had to stop about 115 miles short of his goal. If he continued, he would have been unable to return to the ice, the volcano, which had been baptised Erebus, gave a unmistakable impression of an inferno.

After Ross, a long time went by before there was further exploration of the southern seas. It was not until the last years of the century that the great voyages were resumed. Expeditions followed each other in quick succession. In 1898, the Englishman Captain Leith installed by the crew of experts, headed by the Belgian Adrien de Gerlache, of the ice-bank "Belgica". The 2nd Lieutenant was a Norwegian named Roald Amundsen. . . .

In 1899, Borchgrevink headed an English crew that ventured for the first time on land. In 1902-1903, Nordenskjöld and a Swedish crew spent a dramatic period at the outermost extremity of Graham Island. In 1904, and then in 1909-1910, Charcot, following the route of DuMont d'Urville, led a French crew to the Great South. The Pole itself had not yet been stormed. It was not until 1911 that Captain Scott, with the快餐 FACTORY

THE NAVY
August, September, 1958

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his base; for his provisions would have been exhausted.

The English had got under way on October 24. From the very beginning they were in trouble. A few days after setting out, the motors of the vehicles broke down. The ponies, more sensitive to cold than dogs, died before they reached the mountain.

Twelve men began to climb the fearful Beardmore Glacier, which had been used by Shackleton in 1909 as a way of access to the central plateau: they themselves, noted in their reports, were already laden. Scott reduced the final team by sending seven of his men to Ross Island.

He remained behind with four others and a sled loaded with food and equipment for four persons. They, too, watched the weather. They were afraid of seeing the Norwegians. After a sixty-nine-day march, they arrived exhausted at the Pole already there. Bitter disappointment was added to their fatigue.

They made their way back, in a state of complete exhaustion. Winter was coming on, and the weather grew increasingly worse.

They were beset by one misfortune after the other. But, if we have been willing to give our lives to this enterprise, which is for the honour of our country, I appeal to our countrymen to see that all those who depend on us are properly cared for. Had we lived, I should have had a tale to tell.

When we consider the fact that an American admiral and a dozen generals made a special trip to the South Pole (by plane) in the company of Hillary to welcome Dr. Fuchs, arriving on his "snowcats", we realise the change that has taken place in Antarctic exploration since we arrived there on foot.

Thereupon you'll look around for a while in your air-conditioned suit, ask to see "their leader," and take notes. In due time you'll reboard your landing craft (which converts to a self-launching jet through quick-attaching turbojet pods and tail fairings), for flight back to Earth. Aerodynamic braking after a spiralling orbit lands you safely.

The Australian, Mawson, was the first to pull a single sled at the end of his tether, as he would no longer be a burden to the others. The three survivors could have no cause for complaint but to the will of Providence. determined still to do our best to the last. But, if we have had sufficient courage of our companions which would have stirred the heart of every Englishman. "These rough notes and our bodies must tell the tale".

This tragedy did not stop the pioneers. Scott returned in 1911. But, he left behind the first crossing of the Antarctic from the Weddell Sea to the Ross Sea. His boat was created by ice-bergs before sighting the polar ice-cap.

The Australian, Mawson, was the first to use, in 1913, a ship built by the Australian Navy, after finding Amundsen had already been there. Bitter disappointment was added to their fatigue.

The future of space exploration is now in the hands of those who will have to face the problems of this new means of transport. The engineers must think of the conditions of exploration. The forty-eight stations, which are equipped by eleven countries, have, for the most part, every possible comfort: heating, running water, cinema, electricity, radio, phonograph, etc. The life of the explorer is thus made as comfortable as possible.

At the present time, the International Geophysical Year is making great progress in developing knowledge of that part of the world and in improving the conditions of exploration. The forty-eight stations, which are equipped by eleven countries, have, for the most part, every possible comfort: heating, running water, cinema, electricity, radio, phonograph, etc. The life of the explorer is thus made as comfortable as possible.

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A temperature of about 200 degrees centigrade is enough to produce sufficient vapor pressure from cesium to power a space ship. After the cesium "boils" in its ionization chamber, which contains hot platinum grids, its power is fabulous. From these ions are extracted by an electric field. The field accelerates ions in the thrust chamber to a velocity of about 50 miles per second. They leave the "motor" in a steady flow of electric current.

When our space ship approaches the orbit of Mars (or wherever) a few maneuvers will carry it around the planet. Otherwise, it either would crash on the surface or pass that planet in a heliocentric trajectory. After it reaches the gravitational field of a planet, it must spiral around several times to get close, gradually, without coming a cropper.

Navigation of an outer space ship should be a relatively
simple problem, we are told. Pilot would, of course, keep an eye on heavenly bodies. Direction of the ship, space flight and earlier earth space ship leaves for Mars, its exploratory voyages of the 15th century. We lie drawn between contemplated and actual journeys, by the time the first expedition when he started in 1492.

A crew of approximately 30 persons. The Pinta and Nina had, respectively, gross weights of 50 tons each and carried 18 persons. The Mayflower had a gross tonnage of 180 tons and carried 102 passengers, in addition to a crew of approximately 36 persons.

For interstellar space travel we are preparing for 150 tons payload, with possibly 10 persons per ship.

You can see that, relatively speaking, living conditions on one of these space ships would be rather plush, compared, that is, to the crowding aboard the underfed and foul-smelling Santa Maria and Mayflower.

Pilots of an interplanetary ship obviously should be carefully selected on basis of health, emotion, stability and scientific interest.

Dedicated men of this nature will not mind spending quiet months or years travelling on board a space ship. They simply would pack their briefcases with a backlog of unfinished scientific work and enjoy an excellent opportunity to pursue it without interruption by telephone calls, or by nosy investigators.

This promise alone would entice many a modern scientist to sign up for such a trip.

Now that interplanetary travel is within our technological grasp, it is interesting to speculate on possibilities of interstellar travel (from our solar system to the Milky Way and beyond).

Imagine: You'd depart for a star in the region of the Constellation Vega in the year 1998! Staggering thought, isn't it?

Did Hitler really want to land in Britain or was the whole invasion plan merely part of his war of nerves?

All these questions are fully investigated in "Operation Sea Lion", whose author Ronald J. Wheatley had unrestricted access to the official German archives captured in 1945. In his excellent book he makes it clear that owing to the immense difficulties, invasion could only hope to succeed as the last act of a series of successes starting with the destruction of the Royal Air Force and leading to the virtual collapse in Britain of the will to resist. Hitler himself was well aware of the difficulties, but he decided to prepare, and if possible to carry out, a landing operation against England. He himself was to be in supreme command of the operation. His generals were confident of success. Goering was certain of victory in the air battle. Only Admiral Raeder had a clear appreciation of the hazards of an attempted sea crossing with British superiority at sea. At the end of July, 1940, Hitler decided that the air attack would begin and that Operation Sea Lion must be prepared for operating.

An Australian Margarine blended to suit Australian conditions

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CAPE OF STORMS. By Hugh Popham. (Rupert Hart-Davis, U.K.)

Here we have a vivid account of what is to the men of the trawlers a routine journey towards the White Sea, but Hugh Popham, who went as a passenger in the Brucella, gives us such a fresh and lively narrative that we almost envy him the experience—I say "almost", because he seems to care not at all for the discomforts and even the dangers. As it was the British trawlermen who discovered and pioneered the distant-water grounds, only to find themselves being gradually legislated out of them by countries who came late into the game, but whose shores are closer, it is not surprising that they refer to the Scandinavians generally as "Square-headed bastards" or other non-complimentary terms. But when the British vessels put into Icelandic or Norwegian ports on occasion for food and fuel, for repairs and medical aid the agents come aboard and the crews go ashore and amity prevails.


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THE NAVY

JAPAN AND HER DESTINY. By Mamoru Shigemitsu. (Hutchinson, U.K.)

The author of this informative and interesting book—Mr. Mamoru Shigemitsu—is a scholar and a statesman who served a term of imprisonment as a war criminal. He deals with the course of events during what is called the Showa era, which began in 1926, when the Emperor Hirohito ascended the throne, and his aim is to explain, for the benefit of his countrymen, the reasons for Japan's actions in the various incidents leading up to, and during the war. Throughout most of this long period Mr. Shigemitsu held important diplomatic and Government posts, including the appointment of Foreign Minister for two years after Japan's entry into the war.

Even so, he tells us, he himself was ignorant of many incidents that had occurred until he heard the evidence for the Prosecution and Defence at the War Crimes Tribunal in Tokyo. This convinced him that if his countrymen were to rebuild Japan it was essential that they should understand all that had happened, and why, during the most turbulent epoch of her history.

He writes objectively and on the whole impartially. But he is, perhaps, inclined to be too strongly biased in favour of the statesmen who had over-emphasised their complete lack of power the military. As he points out, the storms from first to last were mainly in connection with the problem of China: and if the politicians had shown firmness and decision at the outset—in the early days of the occupation of Manchuria—Japan might well have avoided the disaster of a major war.

Mr. Shigemitsu's book will be thoroughly enjoyed by all who are interested in Japan of the twentieth century.

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