

## DOCKYARDS AND REPAIR BASES

*This article is taken from a lecture given to the Senior Officers' War Course by the Director of Dockyards, Admiral Sir Claude Barry, and is reproduced with his permission.*

### **The Functions of the Dockyard Department**

By his instructions from the Board, the Director of Dockyards is directly responsible to the Controller for the general management of the dockyards and for all professional questions arising in connection with the building, alteration or repair of ships and boats or their machinery in the dockyards. He is also responsible for the repair by Contract.

There are also other functions which, seemingly unimportant at first, have now grown tremendously in scope and at times seriously threaten to unbalance the picture. The first is the work involved in the installation and repair of the electrical and mechanical equipment in shore stations. The second is the necessity for arranging additional repair facilities all over the world in time of emergency. With the growth of the "Shore Navy", the first has assumed great importance in peacetime while the second naturally becomes a heavy responsibility in time of war.

Both of these will be referred to later but it should be pointed out here that, with the limited money available, all work on shore establishments carried out by Dockyard personnel is at the expense of ship work and renders more difficult our task of keeping the fleet in both a good running condition and up to date as regards its equipment.

A brief reference to our present major commitments will give some idea of the scope of these latter requirements.

Firstly, we have a fleet in rather an exhausted condition after years of hectic war service, a very large proportion in Reserve Categories, and manned by limited and to a certain extent inexperienced personnel. This fleet is gradually being brought back into an efficient condition but much still remains to be done.

Secondly, there is a vital need to bring all classes of ships up to date by either conversion or modernization by the installation of the various new types of equipment which have recently been devised both to improve efficiency and to deal with potential menaces.

The dockyards abroad are of very limited use for this type of work and in any case will be fully occupied with looking after the squadrons stationed there.

Having given this outline, we will examine the subject in more detail.

### **Historical**

To appreciate the complexity of modern Dockyard organization, it will be helpful to trace the development of our Yards. In the main they were established to meet strategic needs in an age of sailing ships. Two of the oldest Yards—Woolwich and Deptford—have long since fallen into disuse as repair establishments, but the three main home dockyards—Portsmouth, Devonport and Chatham—still survive.

The first mention of a Royal Dockyard occurs in records of 1212 when King John instructed the Sheriff at Southampton "to enclose our docks at Portsmouth by a strong wall in such a manner as our beloved William, Archdeacon of Taunton, shall direct". The only known case of an Ecclesiastical Potentate acting as Admiral Superintendent of a Dockyard.

Prior to 1495, docking consisted of beaching a ship and building a temporary wall around it. The first dry dock, built at Portsmouth in 1495, was of wood backed by stones and clay and emptied by a horse-driven arrangement of buckets. The dock gates were not water-tight and had an intervening space to be filled with stones and clay.

Up to the early nineteenth century the only craftsmen required in the Dockyards were shipwrights, carpenters, caulkers, sawyers, smiths, riggers, sailmakers and ropemakers.

Radical alterations followed the substitution of iron for wood in ship construction and the development of steam propulsion, necessitating the addition of steel working and engineering trades to the Yard labour force. Early in the present century electrical developments necessitated the creation of yet another technical department.

With the increasing complexity of ships a far larger labour force is necessary to refit a ship.

Thus in just over 100 years, the Royal Dockyards have developed from a simple one-department organization into the present complex set-up.

### **General Organization**

The Admiral Superintendent at the main dockyards is also deputy to the Port Commander-in-Chief.

The Superintendent is responsible for all Yard activities and for the co-ordination of the work of his departments. Thus he has responsibilities to the Director of Dockyards for the general control of the Dockyard and of the four production departments ; to the Civil Engineer-in-Chief for the Superintendent Civil Engineering department ; and to Director of Stores, Director of Armament Supply and Director of Victualling for the supply departments.

Under the Superintendent are the Principal Officers, each in charge of his own department. First comes the four production Departments.

*Captain of the Dockyard* (C.D.) who is also Deputy Superintendent. He has charge of rigging and sail lofts, pilotage, movements of ships, tugs and Yard craft. Numerically his is a small department.

*Manager Constructive Department* (M.C.D.) is a senior member of the Royal corps of Naval Constructors and is responsible for all ships under construction, repairs and alterations to hull and structural equipment, fittings, etc., for docking and undocking, and launching.

*Manager Engineering Department* (M.E.D.) is a senior Naval Engineer Officer and is responsible for the repairs to main and auxiliary machinery of ships and all boilers, cranes, machinery and mechanical equipment in the Dockyard and shore establishments.

*Electrical Engineer Manager* (E.E.M.) is responsible for electrical installations in ships and shore establishments, generating stations, Yard mains and telephones.

The managers have within their departments powers similar to those exercised by the Manager of an industrial concern, i.e. they have power to enter, discharge or punish men.

In the working of a Dockyard it is important that there should be effective synchronization of departmental effort and good liaison between departments and ships' officers. In matters of importance affecting the four production departments and particularly on shop work the Manager Constructive Department has, in the past, by custom, co-ordinated and initiated action, although this has not been covered by Regulations.

The necessity for such action by one of the departments has become even more important under modern conditions and action has been initiated to instruct the Superintendents of the Dockyards that, in future, the head of the Constructive Department will be held officially responsible under the Superintendent for this all-important aspect of Dockyard organization.

This responsibility for co-ordination will persist through the various levels down to the subordinate officer grade, and the Foreman of the Yard will be responsible for ensuring that the general progress of ships' work of all departments is such as to maintain dates of completion, for seeing that work of departments is co-ordinated to this end, and for calling attention at the earliest possible date to any factors which are likely to cause delay.

In addition to the four production departments, there are a number of other departments which, although not productive, have important parts to play in the Dockyard Organization. Included in these are the Superintending Naval Stores Officer (S.N.S.O.), the Superintending Civil Engineer (S.C.E.), the Expense Accounts Officer (E.A.O.), the Cashier, the Medical Officer, Chaplain, Superintendent of Police, etc.

### **Finance**

The financial management of the Royal Dockyards is the concern of Parliament. The total cost of all labour, material and equipment used at these Establishments in the maintenance and repair of H.M. Fleet and the attendant Shore Establishments is estimated annually and forms an important part of the Navy Estimates. The greatest care is exercised to ensure that the money allocated by Parliament is economically used and properly accounted for and, with this object in view, the Dockyards include in their organization an efficient accounting system. This accounting procedure also produces information for the Heads of Departments responsible for the expenditure of this public money in labour and material and shows clearly how and at what rate this money is being used. The overall financial control of the Dockyards is vested in the Director of Dockyards Vote, on which the necessary money is allocated.

### **Programme**

Labour and material allocations in the Navy Estimates are quoted in bulk form. For practical purposes this provision has to be converted into a detailed programme of work for each Dockyard.

When the sketch estimates are being prepared, the Director of Dockyards evaluates the cost of all new construction, reconstruction, repair work, etc., required to be carried out in the ensuing year at each Yard and includes the appropriate provision in the Sketch Estimates. The estimates, as finally approved, generally involve a readjustment to suit the financial provision actually made.

The programme of each Yard shows specified items of work to be undertaken under certain subheads of the programme. Thus, as regards ships, D.1 refers to major reconstructions, D.2 to large repairs, and D.3 to other repairs, while the cost of dockyard work in connection with shore establishments is included under a series of F. headings.

In short, the programme of Dockyard Work allocates to each Yard the amount it can spend on each type of work during the ensuing year, thereby determining the number of men to be employed and, to some extent, their disposition.

The major items, from a programme point of view, are of course D.2 and D.3, that is Large Repairs and Other Repairs. In effect D.3 is normal refit at yearly or biennial intervals, during which the Dockyard makes good defects reported by ships' officers, whereas a D.2 normally embraces a thorough overhaul after 8-10 years' service ; for this the ship is paid off into Dockyard control and surveyed for defects by Yard Labour.

The allocation of funds between the various Dockyards is to some extent determined by operational requirements, so that the strength of, and the financial provision for, a Yard abroad depends on the size of the Fleet or Squadron required to be maintained in that area. The Director of Dockyards has to ensure that the various fleets can be adequately maintained—or at least to the maximum extent possible within the total money approved—and that ships are completed to a programme which meets operational requirements.

Before the war, with regular refitting programmes and settled active and reserve fleets of known condition, it was possible to plan a programme of Dockyard work for some time ahead. Times of refit could be assessed accurately and New Construction, Reconstruction and Large Repairs, planned on a long-term basis. Thus an even load could be maintained on the Yards with full and steady employment for a known balance of the various shipyard trades and grades.

New Construction and Large Repairs are valuable to the Yards in providing flexibility to meet fluctuations of Fleet requirements.

Conditions since the war have, so far, rendered detailed planning impracticable. We were faced with a large Fleet suffering from hard and continuous use without regular refits and with extensive arrears of maintenance.

The problems presented by this legacy of the war years and by the financial stringency of recent years have been very complex and their difficulty is one of the reasons for setting up a special planning section of my department.

### **Dockyard Development**

Now a word about the Dockyards themselves. They have, as has been indicated, developed gradually from the Yards used for sailing ships centuries ago. In general, development has been piecemeal, due to financial limitations and the layout of our present establishments suffers in consequence.

To plan a Yard efficiently one needs to look very far ahead. For instance, it isn't generally realized how rapidly ships of a given Class increase in size with succeeding designs and outgrow the graving docks. To give an illustration, when war broke out in 1914 there were no less than five graving docks at Chatham capable of accommodating battleships then in service. Today only one of these docks can take our modern cruisers, another can just take the *Didos*—our smallest cruisers—the remaining three docks will take nothing larger than a modern destroyer. Yet they could take the battleships of 40 years ago.

Abroad we are more fortunate. The new docks at Singapore, Sydney and Cape Town, will take the largest ships afloat. The dock at Gibraltar was also widened in the early war years and will take any of H.M. ships.

Development in practically all the Yards in this country—both Royal Dockyards and Commercial—is hampered by lack of space, the shipyards being hemmed in by built-up areas. The blitz cleared many of these and, after

the war, before the financial stringency became so acute, comprehensive development plans were produced for most of the dockyards. These included a new lock-dock at Chatham as an additional entrance to No. 3 Basin, reconstruction of the North Wall entrance of No. 3 Basin at Portsmouth to give some more badly needed berths, and a new Capital Ship Dock at Devonport. In addition, a new and more rational layout of the Workshops and stores was proposed, and the shops themselves were redesigned to meet modern requirements. The plans naturally necessitated taking into the Yard considerable areas outside the pre-war boundaries.

Some of these plans have actually been approved by the Board but money shortage has prevented their being carried out. It is most important that some of the projects should be proceeded with and recently action has been taken to produce considerably modified plans dealing with essential requirements.

### **The Work of the Dockyards**

The total labour force in the production departments of the Royal Dockyards is roughly as follows :—

|                  |     |     |     |     |     |            |
|------------------|-----|-----|-----|-----|-----|------------|
| Home Dockyards   | ... | ... | ... | ... | ... | 40,000 men |
| Dockyards abroad | ... | ... | ... | ... | ... | 17,000 men |

It is important to remember that ship construction and ship repair work comprises only a portion of Dockyard work. Thus in a large Yard 40% of the men in the production departments are employed afloat or in the shops on work directly concerned with ships, the remainder being engaged on Shore Establishments, maintenance work and the many ancilliary commitments of a Royal Dockyard.

### **Ships**

Ships are taken in hand for refit at intervals laid down for each class of ship. In addition, intermediate dockings are required and defects of an urgent nature may arise which cannot be deferred until the next refit.

There has been a growing tendency, in recent years, to ask for work not of an essential nature to be undertaken on ships during periods in harbour for leave or other purposes. The undertaking of this casual work completely upsets the programme of dockyard work and can only be undertaken by taking men from ships in hand for refits or large repairs, often necessitating delays in completions and additional cost.

If we are to be able to cope with the formidable programme of large repairs and modernisations and return to a planned programme of work, then it will have to be appreciated that only in exceptional circumstances, such as damage repairs, can work of any extent be undertaken by the Dockyards on ships, which are not in hand for their periodical refits. It is also of the greatest importance that the maximum of maintenance should be undertaken by ships' staff in order to reduce the expenditure of Dockyard money on ordinary refits and intermediate dockings, and thus make available a greater percentage of the total money and labour voted by Parliament for new construction, large repairs and modernisations.

At the present time a difficulty arises from shortage of ships' staff for undertaking such work as cleaning tanks and clearing up the ship, internal and topside painting, etc. Hands generally are not available for this work and the tendency is to throw it on to the Dockyard, with a corresponding reduction of dockyard labour available for work on other ships of the active and reserve fleets. This difficulty remains but may be partly solved by the introduction

of special tank cleaning equipment and other labour saving devices. It is important to note that this type of work involves expenditure on unskilled labour and leaves less money to pay the wages of the skilled men required for more important work.

### **Other Work**

As stated above, only 40% of the men in the production departments are employed on ship work, the remainder being employed on other work such as maintenance both in the Dockyards and in shore establishments. The work on the latter has increased considerably due to the increase in the number of Scientific, Educational and Training Establishments, including Air Stations, that have been brought into use in recent years, and the diversion of money and labour from ship work to this other is a matter that is causing concern. Investigation is now proceeding with a view to redressing the balance in favour of ship work.

Repair, refitting, modernization and constructions of ships must always be our prime objective and, in view of the very large programme of such work we have ahead of us, it is most important that our available resources should be devoted to this end to the maximum possible extent.

This can be partly brought about by a reduction in the number of shore establishments, and also by a reduction in the amount of maintenance and other work undertaken in the establishments that remain.

### **Refits by Contract**

In addition to the ships in commission, a large fleet is maintained in various categories of Reserve. These ships must receive periodical refits and dockings to prevent undue deterioration and maintain them in the desired condition. For some time after the cessation of hostilities, the Royal Dockyards were quite unable to deal with the Active and Reserve Fleets, then numbering nearly 400 ships, and money was eventually allocated to allow some reserve fleet refits to be undertaken by Contract. This has enabled us to refit a total of over 250 such ships, nearly 50% being by contract. There are, however, still many valuable units which have not been refitted since the war.

It is of interest to note that, so far as is known, a longish programme of refits of ships by Contract has never been undertaken in peacetime before. It is an excellent innovation as it has not only enabled us to get at the problem of refitting the Reserve Fleet, but it provides valuable War potential and at the same time fits in well with the Country's economy now that work in private repair yards is becoming scarce.

### **Emergency Arrangements and Preparation for War**

The foregoing briefly describes the set-up in peacetime to deal with refits, repairs, modernisation and conversions of H.M. ships. In an emergency, however, the volume of repairs and refits increases so greatly that it becomes quite beyond the capacity of H.M. Dockyards.

Expansion to meet the generally increased load involves a much increased use of Contract facilities, and the Director of Dockyards has to provide the necessary Overseeing staffs to assist the contractors and supervise the work undertaken. During the last war the number of overseers provided from the Royal Dockyards exceeded 2,000, involving a serious drain on the "cream" of the Dockyard labour force. This again involves the setting up of a central controlling organization at the Admiralty in London, known as the Emergency Repair Organization.

Dispersal, due to air attacks, involves the opening up of new bases in parts of the United Kingdom which are more remote from the enemy's air bases and the provision of workshop facilities, docks, and the necessary supervision and labour force to man these bases.

In addition to the expansion of the repair facilities to deal with the work that has to be undertaken in U.K., the Director of Dockyards is also responsible for the expansion of repair facilities at Dockyards abroad and the setting up of facilities ashore and afloat at other strategic bases to fit in with the plans of the Naval Staff.

However sea power may be defined, the ability of Naval Forces to exercise this power, depends to a considerable extent, especially during a long war, on the existence of facilities to enable the ships of the Fleet to be maintained in a state of seagoing and fighting efficiency. These facilities—apart from supply questions—consist, in the main, of Dockyards and/or bases where ships can be docked and repairs and refits carried out. This, in turn, involves the provision of docks, well-equipped workshops, portable plant, repair materials and stores, adequate power supply, a suitable labour force, and accommodation for this force.

### **Mobile Repair Facilities**

The last war produced many new problems for the Director of Dockyards. The loss of the repair bases at Hong Kong and Singapore, as well as those in the Dutch East Indies, was a serious blow.

Accordingly it became necessary to take energetic action to provide some substitute as soon as possible for the facilities lost, in order to provide for the maintenance of a Fleet and the mounting of Naval Operations in the East.

The provision of other Dockyards or shore repair bases in substitution for those lost is a long-term project and must in many cases be supplemented or preceded by repair facilities afloat. Such ship-borne facilities have many disadvantages, including the severe limitations of space, restriction of the types of machines and equipment which can be carried, difficulty of carrying the correct proportions of all kinds of materials, for the widely varied jobs which may have to be undertaken, and the provision of boats for transporting working parties. The provision of floating docks is also necessary before any underwater work can be undertaken.

At first sight, the floating dock appears attractive on account of its mobility and lower initial cost. It does, however, require a large amount of steel and shipyard labour for its construction, and a large crew for its operation and maintenance. It is expensive to maintain and uneconomical as regards work on ships in comparison with a graving dock, as men and materials have to be transported by water to and from the dock. Furthermore, these floating facilities are vulnerable to attack.

The advantages are, however, that it affords the only means of providing docking facilities in many areas and it can be strategically placed prior to the outbreak of hostilities.

The use of a floating dock and a repair ship enables repair facilities to be set up more quickly than comparable shore facilities can be provided and these can follow in the wake of operations from base to base and thus provide a closer support for a Fleet than is possible from shore bases.

The planning of adequate repair ships and the attendant accommodation ships, together with material requirements for repairs, is the responsibility of the Director of Dockyards.

## **Shore Bases**

In addition to the Repair Ships, it will also be necessary in future to prepare for and set up new bases ashore. As previously mentioned, this is a long-term project. In the first instance it will be necessary to select sites which are not only suitable from the sea angle, but also from considerations of the land. Good foundations for buildings are necessary. Water supply is essential and rail and/or road communications should be adequate. The base must be built and equipped with as large variety as possible of all the various pieces of equipment and machinery necessary to look after a modern naval force.

In the past, the building of the base has been left very much to chance, making use of such facilities as exist, such as local labour, naval ratings, and the army. For the future, approval has been sought to set up a Mobile Constructional Corps, somewhat on the lines of the American Sea-bases, to undertake this work. If approved, the Corps will work under the general direction of the Civil Engineer-in-Chief.

When the base is built, however, it will still have to be equipped and then manned up with a balanced force of technical officers, mechanics and labourers.

In addition to the above we still have to provide overseers to look after repairs at Contractors' Works abroad which, at some bases, will be the only facilities available.

## **Repair Organization Abroad in the Last War**

The general problem can be illustrated by a brief story of the arrangements we had to make in connection with the repair of the Fleet abroad during the last War.

The middle of 1940 marked the beginning of a docking and repair situation abroad even more difficult than at home. The entry of Italy into the War virtually closed the Mediterranean to normal shipping and, to a large extent, negated the value of Malta as a refit and docking base. Fortunately the Director of Dockyards arranged to transfer A.F.D.5 from Portsmouth to Alexandria just before the War, and this was a major factor in helping us to maintain a fleet there.

Nevertheless, the practical denial of the docks at Malta and the necessity for all shipping to and from the Far and Near East to proceed via the Cape threw an almost intolerable strain on the docking resources of South Africa. The almost total absence of docking facilities on the West and East Coasts of Africa was revealed in stark reality. The only docks available in South Africa were a capital ship graving dock at Durban, a cruiser graving dock at Simonstown and a small cruiser dock at Capetown.

The docking facilities lost at Hong Kong and Singapore were considerable, amounting to sixteen docks, while, in addition, the Dutch lost sixteen docks in the East Indies. The rapidity of the Japanese advance prevented the withdrawal of any of the floating docks to ports in the Indian Ocean. As the Fleet in the East grew, so additional repair and docking facilities became essential.

In February, 1942, the only dock capable of taking a capital ship of the Eastern Fleet was at Durban, 3,600 miles from the base at Colombo.

A number of measures were taken to improve the situation including the following :—

The South African Government undertook, in conjunction with the British Government, to construct a large graving dock at Capetown, capable of taking the largest vessel afloat, and a cruiser graving dock at



East London. The former was completed in 1945 but the latter was not finished until some time later.

The construction of a 15,000-ton floating dock for cruisers was commenced at Durban and completed in August 1945.

In addition, a capital ship floating dock and destroyer floating dock were built at Bombay and towed to Trincomalee.

At Kilindini a repair base was set up, in the first place consisting of a Repair Ship, but later being transferred ashore. Floating docks were planned but did not arrive before the pattern of the war moved further East and the importance of the base diminished.

At Freetown a shore repair base was organized to deal with the large gap between Gibraltar and the Cape. Two floating docks were planned and although one was sunk on passage from the United States, the other, of 15,000-tons capacity, arrived in mid-1943 and remained there until the end of 1945.

At Colombo the difficulty was the fact that only one alongside berth for big ships was available. There were, however, reasonably good engineering and ship repair facilities provided by commercial firms, including a cruiser and destroyer dock.

The construction of a new Naval Yard to deal with the refits and docking of destroyers was commenced in 1943 but, two years later, it was hardly half built and work was suspended.

At Trincomalee similar difficulties were experienced in setting up a shore base. A base was eventually organized with difficulty.

In Australia the Royal Navy played only a minor role in the Pacific until the arrival of the British Pacific Fleet in the Spring of 1945. Nevertheless, construction had been proceeding in Australia on two large graving docks, one at Sydney suitable for the largest ships afloat and one at Brisbane for Fleet Carriers. The Captain Cook Dock at Sydney was completed in February, 1945, and was invaluable to the B.P.F. when it arrived. The dock at Brisbane was completed about the middle of 1944. A major base was built at Woolloomooloo, Sydney, utilizing the deep water berths, the dockside warehouses being transformed into workshops.

### **Special Repair Ratings (Dockyard)**

This branch of the Navy (short title S.R.Rs. (D)) was created in June, 1942, to assist in meeting the growing demands for the experienced manpower necessary for the repair of the fleet abroad. It was impossible to meet the requirements from civilian labour as volunteers were insufficient and there were no powers of directing men to serve abroad similar to those at home.

As men became due for conscription by age or termination of deferment, those who were considered to have had sufficient experience in a trade required in ship repair work were conscripted or accepted as volunteers for the S.R.Rs. (D).

The majority of the officers for the scheme were volunteers from the civilian officers and men of the Royal Dockyards.

The men were given a trade test before acceptance and a short disciplinary course before drafting. Every trade in the ship-repairing industry was represented, there being some 70 grades in all.

The S.R.Rs. (D) were used to man up the shore workshops, repair ships and floating docks in the majority of the emergency bases previously mentioned,

and to man Repair Ships. They were accommodated either ashore or in special accommodation ships or Repair Ships.

Considering the absence of pre-war planning and the difficulties of recruitment, this scheme worked reasonably well. Had the war lasted much longer, however, it would have been impossible under existing conditions to provide enough officers to meet the ever-growing needs.

### **Naval Mobile Repair Force**

In addition to the lack of pre-war planning and the great difficulty of recruitment of suitable officers, there was one important weakness in the scheme. Apart from a few R.N. Technical Officers, the remainder were only civilians in uniform and had no proper status. They retained their civilian rates of pay and were not subject to the Naval Discipline Act.

As can well be imagined, such a position was most unsatisfactory, resulting in embarrassment for the officers who had no disciplinary powers over their ratings. This, in its turn, tended to undermine the morale and reduce the efficiency of the force.

In an attempt to profit by these experiences and to avoid a repetition of the difficulties in any future emergency, Board approval was obtained in 1947 to set up a sub-committee of the Reserves Organization under the chairmanship of the Director of Dockyards to examine this question. The terms of reference were—to consider and report on the requirement for Naval Technical personnel to man-up Repair Ships and advanced Naval Bases, the administration in peacetime being within the structure of the Naval Reserve Organization. The recommendations of this committee have been made and are now under consideration.

In order to give the new Force a more inspiring title than Special Repair Ratings (Dockyard), the name Naval Mobile Repair Force was selected as being a better stimulant to recruitment in peacetime.

It should be noted that the need for this force of skilled men will be greater in the future than in the past, owing to the increased complexity of the modern equipment for gunnery, radar, communications, etc.

In the connection it is my fervent hope that those responsible for design and improvements of the implements of war fitted in H.M. ships, will bear in mind the importance of designing all items so that their maintenance and repair is as simple as practicable.

### **Trend of Design**

I would like to stress the above point which is likely to assume an ever-increasing importance in the future. In recent years the tendency has been to give marked financial preferment to anything which savours of scientific research and development. While there is no doubt of the tremendous importance of this aspect, it is of equal importance to preserve a balanced outlook.

Just as surely as everything that goes up must come down, so also must every new piece of equipment which the mind of the scientist or the hand of the technician produces be capable of repair by the type of labour available.

It is this problem which concerns me greatly and which tends to be overlooked in the joy of producing a new and wonderful piece of mechanism. Every new design means a new repair commitment and adds to the problem of our very limited repair staff.

Everything that can be done to simplify the characteristics and improve the wearing qualities of both new and existing designs does help our task, as also does the greatest possible degree of standardization.

Repair by replacement in advanced areas, with subsequent overhaul of the replaced units centralized in one area, is one promising field of development. This of course does necessitate the setting up of adequate Spare Parts Distribution Centres.

### **Reduction in Numbers in Peacetime**

The natural tendency between wars is to reduce the number of men employed in the Dockyards and, in doing so in the past, we discharged not only good mechanics but even our own apprentices as soon as they came out of their time. This was a short-sighted policy, and we are now paying very dearly for it. Few of these men have returned to the Dockyards, having secured jobs elsewhere.

### **The Future**

To plan ahead, we must know the size of the fleets to be employed, the types of ships to constitute the fleets, the areas in which the fleets will be required to operate, and the effect of long-range aircraft and atomic weapons on the pattern of Naval Warfare.

Should an emergency arise in the next few years, a major difficulty will be the extreme shortage of skilled shipyard labour. As previously stated, ships are becoming more complex and more dependent on skilled technicians for maintenance and repair. On the other hand, labour of the type required is steadily declining. Owing to the counter attraction of office jobs, apprentices are not coming along to fill the places of the older hands as they retire. Unless there is a radical change, the Royal Dockyards will decline.

These are matters which are under consideration and, in order to assist me in the investigation of the problems touched on in this article, Board approval has recently been obtained for the formation of a Planning Section in my Department.

It is the function of this section to keep under review and maintain records of the docking and repair facilities existing in U.K. and abroad ; to prepare appreciations of repair capacity in various parts of the world as required by the Naval Staffs and also to prepare plans for meeting additional material requirements in an emergency, including floating docks, repair shops and other mobile repair facilities, dispersed repair bases, etc.

In addition, it will review the potential of the Royal Dockyards to provide technical officers, overseers and draughtsmen required in peace and in the event of expansion in an emergency, and will also analyse long-term plans referred to my Department from the Board or Naval Staff in order to assess dockyard and contract work involved and prepare programmes to implement such plans.

It will maintain a close liaison with the Naval Staff and in particular Director of Plans, Director of Plans (Q), and Director of Operations Division, which should greatly assist in the preparations for any future emergency.