

## TRAINING OF ENGINEER OFFICERS AND RATINGS FOR THE MERCHANT NAVY

*This report on the post-war training of officers and ratings for the engine-room and stokehold was prepared in October, 1945, by the Engineer Section of the Merchant Navy Training Board, and has been adopted by the Board as a whole.*

### Introductory

(1) This Report sets out our views on post-war training for the engine-room and stokehold. It deals with both officers and ratings.

(2) We have received valuable assistance from many quarters, notably the 1939 Report by the Shipping Federation proposing a system of training engineer apprentices partly on shore and partly at sea; a Memorandum prepared by a technical Committee of Engineer Officers set up by the Navigators and Engineer Officers Union; two Reports from the Institute of Marine Engineers, one dealing with foreign practice and one setting out suggestions for improved training; and a statement and oral evidence from the late Sir George Preece, formerly Engineer-in-Chief of the Fleet.

### II. Training of engineer officers

(3) So far as officers are concerned there is nothing spectacular or revolutionary in our recommendations. That is not because we have not considered fundamental alterations in the present system of training, and considered them carefully, but because we think that shore training is on the whole better than any alternative hitherto suggested, though the present system of shore training is capable of improvement and adaptation.

Under the present system as a general rule no one starts his qualifying sea service to become a certificated engineer officer unless he has had four years' training in an approved type of shore establishment. The regulations governing the type of workshop experience which is approved have been altered from time to time and the modifications have usually been determined by technical developments. During the course of the present war considerations of supply have not been ruled out in making temporary modifications in other parts of the examination regulations.

(4) This insistence on shore training has obvious advantages for the Shipping Industry. It taps the widest possible field for entrants; when a youth does go to sea he is of an age when he may be expected to know his own mind; and, on the whole, much better and more varied technical training can be given ashore than even in the best equipped ships. This is particularly true since the machinery of the best equipped and maintained ships is the least likely to break down or to require opening up at sea.

The main disadvantages are equally obvious. The Shipping Industry has no choice in the early selection of its engineers; a youth may give the sea only a very half-hearted trial without any real determination to make it a career. Moreover, there are engineers who go to sea merely to get a Ministry of War Transport Certificate because it is a useful qualification, highly prized ashore.

But the greatest potential disadvantage of the present system is that if shore industries find any difficulty in absorbing a reasonably steady flow of apprentice engineers, the effects will in due course be felt in shipping.

(5) These difficulties arose between the two wars. For many years Ship-building and most sections of the Engineering Industry were working at much less than full capacity and the number of apprentices fell sharply and when, in 1936, these shore industries began to show signs of improvement there was still a four-year "time-lag" for shipping.

(6) It was this unsatisfactory supply position which, in 1939, led the Shipping Federation to publish a scheme under which the Shipping Industry would itself train some proportion of engineers instead of relying entirely upon shore industries.

The scheme was never intended to provide the majority of engineers on board ship. It was an alternative, additional to the ordinary shore workshop method. It provided for 4½ years' training. Engineer cadets, apprenticed to owners as in the deck department, were to spend their first year in theoretical and practical training in specially and adequately equipped shore engineering colleges; they were to spend their second, third and fourth years at sea in vessels recognised by the Board of Trade as suitably equipped for practical training and, during that period, they were to keep in touch with their shore colleges by correspondence courses. They were to finish up with six months' further attendance at a shore engineering college to prepare for their Second Class Certificate. The length of the apprenticeship and the allocation of time as between ship and shore were stated tentatively as proposals only. The degree of shore-cum-sea training embodied in the scheme would, it was also hoped, develop sea-mindedness and instil or develop officer qualities.

(7) Our task to-day, however, is different from that of the Shipping Federation in 1938. The problem now is not so much to increase the quantity of the entry but to increase its quality by suggesting the best technical training that can be given. It is, at least in the eyes of an important section of those who have given much thought to this matter, unfortunate that two objects, viz., the best form of technical training during apprenticeship and the development of a "sea bias" in the apprentice at an early and impressionable age, seem, at least at present, to be incompatible. We cannot work out any scheme of sea apprenticeship or combined "sandwich" arrangement which in our judgment might be expected to produce the same degree of engineering competence in the few years available as a training given wholly ashore. In this connection we wish to make it clear that there should be nothing static in any section of education, and we should deprecate anything said in this Report which might discourage useful experiments.

We have considered a draft scheme prepared for the Section by the Navigators' and Engineer Officers' Union. Like the Shipping Federation Scheme referred to in paragraph 6, this scheme is meant only as an alternative method of training, and for limited numbers. It differs in important particulars from the Shipping Federation Scheme. It provides, broadly, for careful selection at the age of 16; for joint education for 9 months with future navigating officers and at the same pre-Sea Training School (the curriculum, however, being adapted for education in theoretical and practical engineering); followed by six months at sea in selected ships fitted out for the purpose; and completed thereafter by 33 months in approved workshops ashore with at least one day per week at a Day Technical School. One of the main objects of the scheme is to discover and to develop officer qualities and to make sure that from the earliest stage the navigating and engineering side work together—a most desirable object.

To be given any real chance of success, however, such a scheme would require modification in the Ministry of War Transport regulations.

We repeat our view that reasonable experiments, however revolutionary, should be supported, always provided they seem likely to produce competent engineers.

(8) We therefore recommend that the training of marine engineers should continue to be in workshops and technical colleges ashore. We are the more encouraged to do this because the day release system of the new Education Act will of itself make for better technical training.

(9) The representatives of the Officers (Merchant Navy) Federation consider that it would be desirable—and indeed essential in any post-war Pool system—that all entrants who go to sea with a view to becoming engineer officers should be chosen from a list of applicants jointly selected by the Industry. This view is not shared by the Engineer Section of the Training Board as a whole.

(10) Our specific proposals for the improvement both of workshop practice and of technical training for apprentices are as follows :—

FOR ALL. We have two general suggestions to make :—

- (i) *Workshop Service Record.* It is generally admitted that workshop experience varies enormously. It is impracticable to draw up a panel of approved workshops conforming to some minimum standard of requirements, although this would be very desirable. The best we can do in this direction is to recommend a standard and reasonably comprehensive form of workshop service testimonial. The sort of document we have in mind is attached. (*Appendix A.*)
- (ii) *Welding, etc.* We recommend the following additions should be made to the rules regulating qualifying workshop service :—
  - (a) *Welding.* Full time up to a maximum of 3 months.
  - (b) *Manufacture or repair of substantial electric plant.* Full time up to a maximum of 12 months.

FOR A LIMITED NUMBER OF SELECTED APPRENTICES. Each year a limited number of apprentices should be selected after completion of their third year of apprenticeship for a further two years' special training. These apprentices would receive the following practical and technical training :—

- (i) *Before Selection.* Three years in works with not less than two years in the fitting and erecting shops. During this period part-time education should secure them an Ordinary National Certificate.
- (ii) *After Selection.* Alternate periods of six months each full time attendance at a Marine Engineering College and at a Works, giving normally one year in each. The College training should lead to the Higher National Certificate, and the College Course should include Marine Engineering and Electrical Technology. The Works training should include experience in erection and in a drawing office. The College training for these selected apprentices should be associated as closely as possible with shipping in port. We regard this as of prime importance. Some (perhaps two) of the existing Technical Colleges would have to be adequately equipped to give the necessary training.

(11) The co-operation and agreement of the Engineering Industry ashore would be required both in order to secure the necessary workshop experience and the release of selected apprentices for full time attendance at a College, and because the period of workshop practice can only give the best results if the apprenticeship is planned, and spent in a Works dealing with the manufacture or repair of heavy machinery. In view of the interest of shore engineering in ship machinery and equipment we believe that this co-operation could be secured.

(12) The selection of suitable apprentices under this proposal would be made by a Board composed of both sides of the Shipping Industry. Candidates would offer themselves with a recommendation from their employers, and although a reasonable standard of general and technical education would be necessary to ensure the probability that the selected apprentice would benefit by special opportunities, we would hope that selection would not be determined primarily by skill in passing examinations. The apparent fitness of a candidate to be an officer and to succeed in that capacity at sea should, we suggest, be a prime factor in his selection.

(13) We must emphasise the fact that our proposal is experimental. It is, therefore, in the first instance at any rate, but an alternative to the present system. It depends for its success entirely on the goodwill of the appropriate shore establishments, but we are confident that with the right approach their goodwill would be readily secured and maintained.

(14) We have given no indication of the number of entries which we think might be expected under this special training scheme. If the number at the outset were, say, 100 per annum, which is one-fifth of the average total number of candidates who used to sit for the Second Class Certificate, and if the cost of tuition and subsistence where necessary during the total College period of one year were, say, £200 per candidate, the scheme would cost £20,000 per annum, plus cost of administration. Results alone would show whether the annual number chosen to launch the scheme should be increased or diminished.

(15) We strongly approve Marine Engineering Colleges maintaining a system of Correspondence Courses for the benefit of engineers and potential engineers at sea.

(16) We now come to the question of how suitable ratings can become certificated engineer officers. In theory it is possible, under the Ministry of War Transport Engineer Examination Regulations, for a candidate to submit sea service, in a prescribed ratio, as equivalent to the whole of the workshop service required, but in practice such candidatures are not put forward. We think, however, that something better is needed, and we recommend arrangements along the following lines :—

- (i) Ratings should be selected after 4 years sea service in the engine-room, in the capacity of greasers or donkeymen, for further training extending over 2 years in a Marine Engineering College, after which, if qualifying, they would go to sea as engineer assistants. (See Part III.) After service at sea for 18 months as engineer assistants they would be deemed eligible to sit for the Second Class Engineers Examination.
- (ii) The selection from the ratings should be made in the first place by the chief engineer of the ship, and candidates would, after nomination by the superintendent of the company, be finally selected by a Central Selection Board representing the Industry and the Government Departments. Direct application by candidates to the Central Selection Board would not be prohibited.
- (iii) The bases of selection would be :—

Capacity to qualify in the course in the time prescribed—and due regard would be paid to studies by Correspondence Courses by the rating prior to selection.

Officer-like qualities.

An age range of 23 to 30.

- (iv) The College training would be for 2 years and would be partly practical and partly technical. Assuming a College week of 35 hours, it is recommended that 9 hours should be devoted to technical studies and 26 hours to workshop practice and technology. The technical studies would cover :—

English,

Mathematics, Engineering Science, Heat Engines and Engineering Drawing—(to Ordinary National Certificate standards. Qualification would exempt from Part (a) of the Second Class Examination).

The workshop practice would cover :—

Fitting,

Machine Tool Work,

Foundry Practice and

Welding.

Proficiency tests at 6-monthly intervals would be applied during the College Course. It is proposed to give the training in one or two existing Marine Engineering Colleges.

### III. A new intermediate grade

(17) While it seemed to us right and proper to make the provisions in the foregoing paragraph which would enable ratings to become certificated engineer officers, we recognise that the number who will actually avail themselves of these facilities will be relatively small. Accordingly, the Section discussed in detail and at length the desirability and consequences of establishing an intermediate grade, which the National Union of Seamen most strongly advocate, in between the petty officer grade (e.g., Donkeyman) and the certificated engineer officer.

The principle of such an intermediate grade is opposed by the Marine Engineers Association and the Amalgamated Engineering Union, mainly on the grounds that it is a retrograde step which, in practice, might involve de-rating some who have already attained officer status. Accordingly it is to be understood that neither of these organisations is associated with any observations in favour of such a grade appearing in this section of our Report. The ship-owners' representatives are fully in favour of an intermediate grade such as is strongly advocated by the National Union of Seamen.

In view of the division of opinion amongst the representative sections of the Industry on this matter, which the Government Department members of the Section regard as one for the National Maritime Board, the Government Department members took no part in the discussions on this part of the Report and are not committed one way or another so far as it is concerned.

(18) The Section realises that several consequences would follow the institution of an intermediate grade but, with the exception of those parties already mentioned, they are in favour of the principle in outline for two main reasons :—

- (a) that it would give a practical chance of promotion to ratings who could never hope to obtain a professional qualification but who have proved themselves competent and reliable ;
- (b) the feeling which is known to exist, and to exist very strongly amongst senior Engineer Officers on board ship that the title " officer " is far too lightly bestowed and that this is detracting from the status of ships' engineers as a whole.

(19) We appreciate that the engineroom is not the only place where this problem exists and that as important problems of selection, remuneration, manning and accommodation are involved it is a matter for final determination by the National Maritime Board. But, in order to assist the National Maritime Board, the Section, subject to the exceptions and reservations named, puts forward the following comments.

- (a) It is considered that an intermediate grade is desirable. The problem is to find a practicable solution.
- (b) It is impracticable to confine the status of officer to engineers with certificates because this would cut out many uncertificated men who are, and have for long been, in charge of a watch.
- (c) The need for an intermediate grade is most acute in the largest types of ship and becomes less acute as the total engineroom complements becomes smaller. But this does not mean that the need is confined to the largest type of vessel. It means only that any solution must be one which does not adversely affect the small ships.
- (d) The same uncertificated engineer might have the choice of being an engineer officer (uncertificated) in a smaller ship, or an "intermediate grade" in a larger. The grade would be filled by two categories—the young man prior to taking his certificate, and the older man, perhaps a steady rating who, however good at his job, could never hope to take his certificate.
- (e) We have considered various descriptions of the grade we have in mind, and the description is important because feelings are easily roused on this subject. "Mechanic," "assistant engineer," "engineroom artificer"—all have their advocates, but on the whole perhaps the best title is "engineer assistant."
- (f) It is believed that such a grade of "engineer assistant" is practicable and that its institution would be beneficial equally in improving the status of engineer officers and in widening the field of advancement open to ratings. They could then aspire to be engineer officers in smaller ships, or rise, with certificates, to the top as engineer officers in any ship.

#### IV. Training of ratings

(20) The Law stipulates that no one can go to sea as a trimmer or stoker under the age of 18. For that reason we have no problem under the compulsory sections of the new Education Act.

(21) Before the war it was usual for ratings to enter the engineroom or stokehold without any preliminary training. Although the transfer to oil fuel, however, meant a cleaner job, and attracted better men, it must also be recognised that some were not of the best type.

As the war developed it was felt essential to build more and more coal burners as part of our reply to the U-boat and air menace. But coal-burning firemen were becoming rarer. Accordingly the Shipping Federation started an experiment—the first of its kind—a special School for training coal-burning firemen. The course was a short one—two weeks' training as a fireman, including muscular development as well as an elementary knowledge of the purpose of good firing, followed by one week's training in seamanship.

The results were so satisfactory that five such schools were established in the country—Cardiff, Glasgow, Liverpool, London and Newcastle, all run under the aegis of the National Sea Training Schools Committee on which the

Shipping Federation, the National Union of Seamen, the Ministry of War Transport and the Ministry of Education are represented.

The Course lasts for three weeks. During the first two, trainees receive instruction from engineer officers on boilers and engines, the principles of combustion and the correct method of firing the different types of coal and the elimination of smoke. Trainees are also given practical stokehold work. They learn how to use all firing implements. They also receive special physical training designed gradually to fit them for the heavy work entailed. The seamanship instruction in the third week includes the use of various types of life-saving equipment, launching of lifeboats and boat pulling.

(22) We strongly recommend that training arrangements for coal-burning firemen should be developed from war-time experience and we consider that it would be desirable to extend them to oil-burning firemen.

We also strongly recommend that everyone who goes to sea either in the engineroom or the stokehold, whether as officer, engineer assistant or rating, should undergo the course for the lifeboatman's efficiency certificate.

#### V. Finance

(23) It is no more possible now to go into the details of finance than it was when the Deck Section Reports were prepared. The Government and the Industry will, of course, have to play their part.

As regards the Government, it seems clear that it will make a considerable contribution in financing technical education for shore industries.

As regards the Industry, it will naturally want to know what the Government is doing for other industries as well as see in broad outline what the training commitments as a whole will be. The Deck Section Reports have already been published, but until the Catering Section submits its Report the total commitments will not be known. This Report contains our suggestions for the engineroom and in this connection we should say that we have had a very welcome offer by the National Union of Seamen to provide scholarships under par. (16) of the Report. The scholarship idea might perhaps commend itself to the Industry also—not only for ratings but for engineer entrants. But the first question to decide is whether the proposals are likely to improve the quality of engineer officers at sea. If, by so doing, they contribute towards the competitive position of British shipping, we do not doubt that the incidence of cost can be satisfactorily settled between the parties most concerned.

But whatever the final allocation of cost may be we attach importance to two principles:—

- (a) Within the limits of the scheme as a whole, lack of parental funds should be no bar to training the able youth; and
- (b) training should not be given for nothing if the youth or his parents can afford to make a contribution.

SPECIMEN FORM OF WORKSHOP SERVICE TESTIMONIAL.

Name and Address  
of Engineering Works.....

I certify that the following is a full and true statement of the Workshop Service performed  
by.....under my supervision at the above works.

Period of Service. Dates		Total period	Nature of Duties. For appropriate description see below	Particulars of weekly release periods to permit apprentice to pur- sue technical studies
From	To			

Report as to Ability.....

Report as to Conduct.....

Remarks (if any).....

Signature of employer or his representative.....

DESCRIPTION OF DUTIES.

- I. Fitting and/or erecting in the manufacture and/or maintenance of substantial machinery (e.g. machinery with main shaft exceeding six inches in diameter).
- II. Fitting other than on substantial machinery.
- III. Metal turning (good heavy work).
- IV. Machine work (other than lathe).
- V. Work in Drawing Office, as draughtsman or engineer.
- VI. Other work, the nature of which should be specified.  
The use of the appropriate numerals is sufficient except in case VI.