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Sub-Regional Workshop on Shipbuilding,
Shiprepair and Design for
Mediterranean Countries

Valletta, Malta, 23 - 27 April 1979

RECENT EXPERIENCE AND PROSPECTS FOR THE DEVELOPMENT OF SHIPBUILDING AND REPAIR IN DEVELOPING COUNTRIES*

by

TERMINAL OPERATORS LTD.**

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** The views expressed in this paper are those of the consultants and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

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1. INTRODUCTION

1.1. BACKGROUND TO THE STUDY

A Workshop in Shipbuilding, Shiprepair and Design has been organised by UNIDO in co-operation with the Government of Malta for the countries of the Mediterranean sub-region. Its purpose is to promote co-operation among developing countries of this sub-region in the establishment of shipbuilding and ship-repairing potential. The Workshop will be held at Valleta, Malta, 23rd to 27th April, 1979.

Through Terminal Operators Limited, international maritime consultants of London, Mr. John Peach B.Sc. has been commissioned, by UNIDO, to prepare this study report on the sub-regional scene with a view to providing integrated information for the discussions. Mr. Peach will attend and act as Rapporteur at the Workshop and prepare the final report summarising its conclusions.

1.2. TERMS OF REFERENCE

A copy of the contract document setting out the Project Definition for this Report is included in the Report as Appendix 1. The Workshop activities will cover:-

(i) Present position of the shipbuilding and shiprepair industry in the industrialised and developing countries;

(ii) Major world trends in the shipbuilding and shiprepair sector;

(iii) Conceptual information on the world shipbuilding and ship-repair market;

(iv) Specific problems confronting the developing countries in the task of establishing their maritime industries in general and of the shipbuilding and shiprepair sectors in particular;

(v) General viability criteria for establishing the shipbuilding and shiprepair industry in the groups of countries at different levels of development, taking into account the demand and supply, availability of production factors, the costs, the possibilities and conditions for investments and the availability of appropriate equipment and technologies;

(vi) Policies to be pursued at Governmental and enterprise level in the developing countries;

(vii) Institutional establishments and their role in developing this sector;

(viii) Training requirements and opportunities;

(ix) Modes of international co-operation with a view to promoting the establishment of this sector in the developing countries. Suggestions for a co-ordinated effort on the part of the international organisations competent in the maritime field.

2. DEVELOPMENT OF WORLD SHIPBUILDING CAPACITY SINCE 1950

1. The Second World War created a requirement for new ships, to replace those which had been lost, of immense proportions. Shipyards in the United Kingdom had been relatively untroubled by war damage and, with a large home-based shipping industry anxious for new tonnage, it is not surprising that a major proportion of the new orders were placed with British Yards. In 1951, 38% of all the new tonnage completed came from British Yards. Britain's supremacy as a shipbuilding nation was to last until 1956 when Japan and West Germany emerged as major competitors.

2. Although order books and output in the UK were at a much higher level than pre-war, these levels were being maintained through the use of existing yards and facilities. The problem facing shipbuilders in the UK was how to modernise existing yards, or establish new ones, without disrupting production too much, in a country where areas suitable for shipbuilding were difficult to find. Rarely does the opportunity arise to plan the layout of a new shipyard from scratch. The effects of war time damage on West German shipyards and post-war government policy on Japanese shipyards meant that a large proportion of both country's shipyards were completely rebuilt, either on the existing site or afresh elsewhere.

3. Japan's emergence as a shipbuilding nation started in 1951. Although Japan had lost a large proportion of her shipping during the war, her shipyards had been relatively undamaged. Thus, when established builders were forced to turn away orders, due to already full order books, Japanese shipbuilders were in a position to accept them. The Japanese Government gave their shipyards every

encouragement by providing Japanese shipowners with low interest loans repayable over long periods. As an additional incentive to persuade their domestic owners to build at home, the Government imposed tariffs on imported vessels. The importance of having a strong home market as a spring-board from which to attack world markets is discussed on Page 21 .

4. By the end of the war approximately 70% of West Germany's shipyards had been destroyed. Instead of having to "make do" with existing facilities in old fashioned yards, as was the case in Britain, West German shipbuilders were forced to build new yards. Unlike the Japanese builders who had lacked shipbuilding experience initially and who opted to build relatively unsophisticated tonnage as a result, the German builders had years of experience behind them. The new shipyards were modern in concept and were built around the new techniques then available rather than adapted to make as much use of them as possible. West German shipbuilders were to establish a reputation for building the more sophisticated types of vessels, a reputation which they still have today.

5. The evolution of the supertanker was to revolutionize shipbuilding and ship-repairing and to have long-term effects on both industries. By 1957, ships of 100,000 tons deadweight were being operated by Daniel K. Ludwig, Aristotle Onassis and by Stavros Niarchos. These men were however considered to be a trio of eccentric gamblers by the majority of the shipping world. In 1960 there were 3 ships of over 100,000 deadweight in service increasing to 19 in 1965. The 200,000 deadweight barrier was broken in 1966 when the "Idemitsu Maru" (206,006 deadweight) entered service.

6. The economies of scale which could be achieved through the use of such large vessels were already apparent (see Figure 1). Many owners were, however, reluctant to commit themselves to large ships partly because of fears that they would crack or break up in a seaway and partly because of a lack of suitable repair facilities. They envisaged that the latter might cause problems in the event of a breakdown. The closure of the Suez Canal in 1967 gave new impetus to large ship construction. The route via the Cape of Good Hope added twelve days each way to the voyage to the Middle East from Europe and back. If supplies of oil were to be maintained at the same levels, either more ships or larger ships were required. The size constraints which had been imposed on vessels which were required to transit the Suez Canal no longer applied on the Cape route and the longer voyage distance meant even greater economies of scale were achievable. The VLCC gained respectability when Shell Tankers took delivery of 11 ships of around 210,000 deadweight each in 1968. The acceptance of this type of ship, by such a large and respected oil company, apparently dispelled the doubts of other operators who had hitherto been reluctant to venture into the large ship field. Ludwig, however, had already moved on to ships of over 300,000 dwt with the "Universe Ireland" and "Universe Kuwait" which also entered service in 1968. The growth of the VLCC fleet between 1968 and 1974 is summarised in Table 1 below.

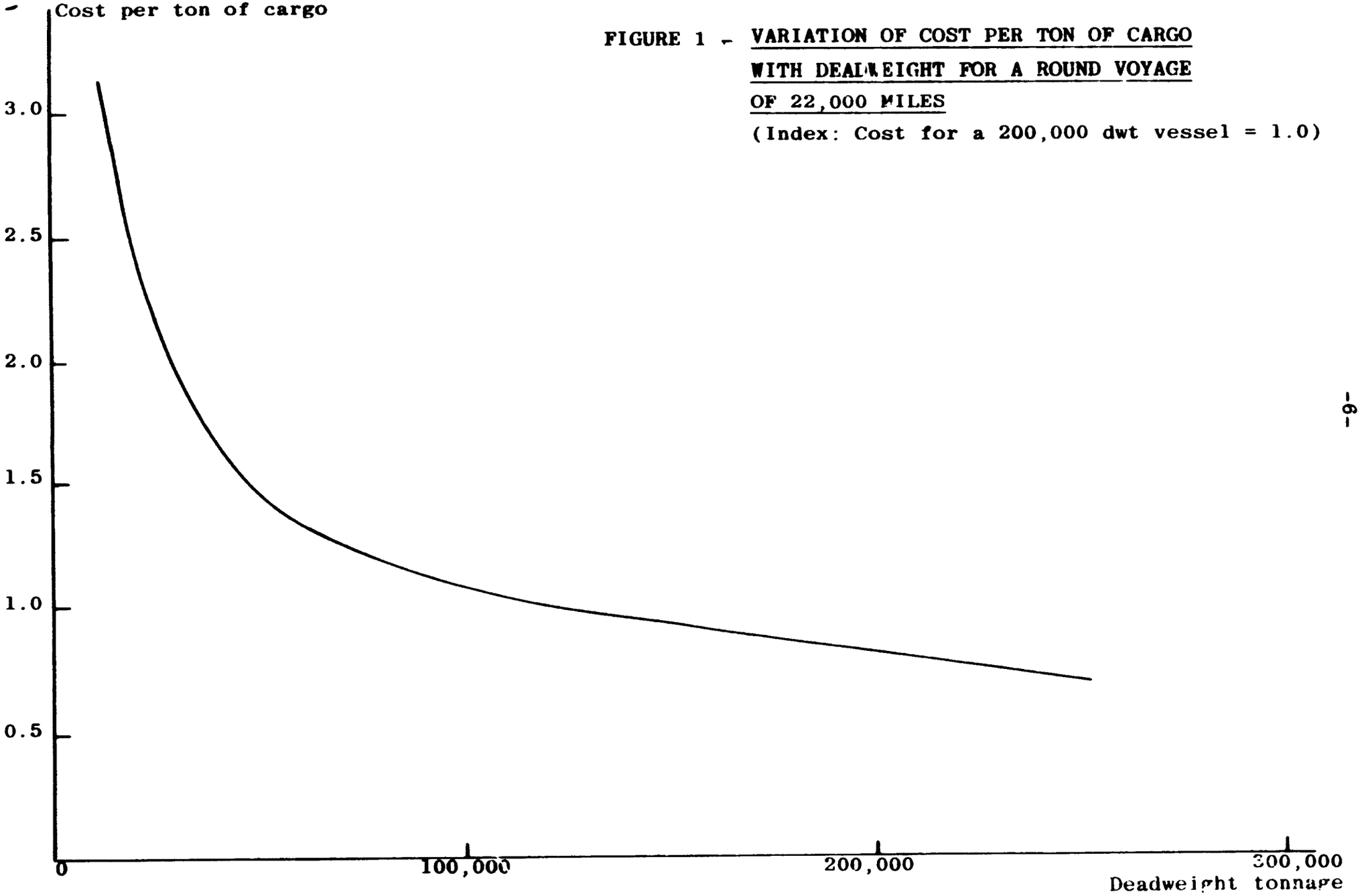
TABLE 1 NUMBERS OF SHIPS OF MORE THAN 100,000 DWT IN SERVICE*

YEAR	NUMBERS OF SHIPS IN SERVICE		
	Over 100,000 dwt	Over 200,000 dwt	Over 300,000 dwt
1968	102	19	2
1970	304	134	6
1972	548	285	8
1974	895	506	16

*includes Combination Carriers

FIGURE 1 - VARIATION OF COST PER TON OF CARGO WITH DEADWEIGHT FOR A ROUND VOYAGE OF 22,000 MILES

(Index: Cost for a 200,000 dwt vessel = 1.0)



7. The seemingly insatiable demand for large bulk vessels, which existed prior to 1974, encouraged both developed and developing countries to expand their shipbuilding facilities. For the developed, high cost, countries the construction of large tankers, dry bulk and combination carriers lends itself to flow line production techniques and to automation of many operations, thereby substituting machinery for manpower. Swedish shipbuilders particularly were quick to realise the economic advantages which could be gained by building ships in series, by utilising advanced welding and cutting techniques and by implementing computerised systems for production and administration. They were so successful that by 1971 Swedish shipyards had the highest output of all the European countries and were second only to Japan.

8. Developing countries were also looking to shipbuilding as a means of development during the 1960's. Shipbuilding's dependence upon other industrial sectors of an economy to supply the inputs which are required for the industrial production of ships, has made it one of the principal generating forces in the development process and explains why many governments have encouraged it. This has been particularly so in those countries who have also wanted increased participation in the transport of their own trade and who have developed shipbuilding and shipping industries simultaneously. The establishment of a shipbuilding industry capable of building unsophisticated ships in series, using modern technology to replace traditional skills where these were not available, was both a feasible and desirable proposition for developing countries. This was particularly true when demand for new tonnage could not be met by shipyards in traditional shipbuilding countries alone, despite the fact that they too had increased capacity substantially.

9. The situation changed dramatically in 1974. While 1973 had been a boom year it was becoming clear that growth could not continue at 1972 and 1973 levels. Inflationary pressures were already apparent in the industrial world - shortages of raw materials, equipment and skilled labour for example. The quadrupling of oil prices by the producing countries intensified the problems of the industrial world and caused balance of payments deficits for the oil consuming countries as against the producing countries. The net result was an almost unprecedented deceleration of growth and a reduction of demand and employment in industrialised countries. Shipping demand which had risen by 17.3% in 1973 in ton-mile terms, rose by only 4.7% in 1974 and decreased by 7.1% in 1975 as compared with 1974, bringing it back to approximately the 1973 level of demand.

10. While the oil price increases had an almost immediate effect on the demand for sea transport, the supply situation could only be adjusted over a much longer period. Although levels of demand in 1973 and 1975 were similar, the total tonnage available in mid-1975 was about 22.5% higher than mid-1973. The oversupply situation was compounded by the fact that the ships under construction and on order (4,798 ships of 102,137,238 gross tons) represented a further increase of 29.9% on the existing world fleet. Oil tankers under construction and on order, at mid-1975, would have increased the existing oil tanker fleet by 44.8% if some owners had not cancelled orders or replaced them with orders for other vessel types, notably bulk carriers. Substantially increased oil revenues enabled producing countries significantly to increase their imports of manufactured goods. The short term effect of this has been to stimulate demand for general cargo tonnage thereby encouraging owners to purchase vessels of that type. The longer term effect

will be to transfer the tanker tonnage surplus to the general cargo sectors and particularly the roll-on/roll-off, container and refrigerated cargo sectors. These are all likely to be oversubscribed when ships currently on order and under construction enter service.

11. Clearly some form of rationalisation of shipping supply is necessary. Measures which have already been taken to alleviate the over-supply situation include lay-up, slow steaming, accelerated scrapping, cancellation of orders (which may cost the owner between 10% and 20% of the contract price) and transfer and conversion of existing tonnage to other purposes.

12. While owners are having to resort to these measures in order to maintain employment for existing ships, there is little incentive for them to place orders for new ones. The world ship-building order books are now at their lowest level since 1965 with the result that the competition is extremely fierce for those orders which are available. The developing countries who expanded their capacity during the tanker boom are now well placed to secure a large proportion of the business. Experience gained over the past few years means that they may no longer be restricted to building a few basic ship types (see paragraph 24 below). Relatively cheap and amenable labour forces ensure that prices are low by world standards and that delivery dates are met. Seven developing countries (South Korea, Taiwan, India, Singapore, Brazil, Argentina, and Peru) currently have sufficient orders to last them four years, compared with a world average of 17 months and an OECD average of 14 months.

13. Measures which have been taken by shipowners to reduce the supply of ships have already been mentioned. It is now apparent that action by shipbuilders is also necessary to reduce shipbuilding capacity to levels required by current market conditions. The developed countries are reluctant to reduce capacity since, with the exception of Japan and Sweden, they expanded least and therefore argue that they have contributed least to the overcapacity which now exists. The developing countries, who have been responsible for a major proportion of the expansion, are also reluctant to reduce shipbuilding capacity. They argue that they can still attract orders on a strictly commercial basis and that they are dependent on their facilities for building up the merchant fleets which are now required to carry their own cargoes. The difficulties of achieving international agreements on plans to reduce shipbuilding capacity are apparently insurmountable. Nevertheless, reductions are now required and several countries have already implemented their own plans for reducing shipbuilding capacity by the early 1980's.

3. SUPPLY OF AND DEMAND FOR SHIPBUILDING AND SHIPREPAIR

3.1. COMPENSATED TONNAGE DEFINED

14. Statistics relating to shipyard output are generally based on gross registered tonnage. Such figures give no indication of the work content per gross registered ton or of the value of the completed ships. The concept of compensated tonnage has been developed as a means of overcoming the inadequacies of statistics which are based on gross registered tonnage alone.

15. Briefly, compensated tonnage is a method whereby a certain type of vessel is taken as unity and all other classes are correlated to it. The unity factor which has been taken is "cargo vessels 5,000 deadweight and over". This has been given a coefficient of 1.0 and consequently the coefficient for large tankers for example become less than 1.0 as the work content per gross registered ton is less; conversely coefficients for more sophisticated vessels are greater than 1.0. By multiplying gross registered tonnage data by the relevant compensated tonnage coefficient, a more realistic measurement of shipbuilding output is obtained which reflects the man hours involved in construction and the value of the completed ships. The coefficients which have been used for this study are those agreed by the Association of West European Shipbuilders. They are reproduced in Table 2.

3.2. SHIPBUILDING

3.2.1. SUPPLY

16. In order to estimate the total capacity of the world's shipyards, the coefficients described in 3.1 have been applied to the gross registered tonnage figures given in "Llovds Register

TABLE 2

THE ASSOCIATION OF WEST EUROPEAN SHIPBUILDERS' REVISED COEFFICIENTS OF COMPENSATED TONNAGE

Cargo under 5,000 dwt	1.60
5,000 dwt and over	1.00
Passenger cargo	1.60
High speed liners	1.60
Container ships	1.90
Tankers under 30,000 dwt	0.65
30-50,000 dwt	0.50
50-80,000 dwt	0.45
80-160,000 dwt	0.40
160-250,000 dwt	0.35
250,000 dwt and over	0.30
Multiple purpose (all sizes) and product tankers	0.80
Bulk carriers under 30,000 dwt	0.60
(inc. ore/oil) 30-50,000 dwt	0.50
50-100,000 dwt	0.45
over 1,000,000 dwt	0.40
Refrigerated cargo	2.00
Fish Factory Ships	2.00
Gas Carriers	2.20
Chemical Tankers	2.20
Passenger Ships	3.00
Ferry Boats	2.00
Fishing Vessels	1.50
Miscellaneous Vessels	1.50

Shipbuilding Returns" for 1975 and also for the year ending 30th June, 1978. The 1975 output represented the outcome of the "sellers' market" situation of the immediately preceding years. It is reasonable to assume that shipbuilders were working to capacity at that time and that total output represented total potential output i.e. capacity. By mid-1978 the total order book had decreased considerably when compared with 1975. Shipbuilders had not reduced capacity, however, and ships under construction, both in gross tonnage terms and in terms of numbers of ships were essentially the same as in 1975. The character of the order book had changed appreciably with a shift of emphasis from large bulk carriers to smaller, more sophisticated, dry cargo carrying and special purpose ship types. Outputs for 1975 and for the year ending 30th June, 1978, in terms of compensated gross registered tons of ships and numbers of ships completed by country, are shown in detail in Tables 8-11. The figures are summarised in Table 3 below:-

TABLE 3 - A COMPARISON OF SHIPBUILDING COMPLETIONS BY SHIP TYPE FOR 1975 AND FOR THE YEAR ENDING 30TH JUNE, 1978

SHIP TYPE	1975		Year ending 30/6/78		% change
	Thousand compensated gross tons	% of Total	Thousand compensated gross tons	% of Total	1975-78
Oil Tankers	8718.7	44.0	3238.2	15.9	-62.9
Combination Carriers	819.2	4.1	363.3	1.8	-55.7
Ore & Bulk Carriers	2223.3	11.2	3189.4	15.7	+43.5
General Cargo*	4492.0	22.7	8716.9	42.9	+94.1
Liquefied Gas & Chemical Tankers	1657.9	8.4	2754.8	13.6	+66.2
Fishing Vessels	741.0	3.7	339.9	1.7	-54.1
Miscellaneous	1159.0	5.9	1699.4	8.4	+46.6
TOTAL	19811.8	100.0	20301.9	100.0	+2.5

Source: Lloyds Register of Shipping Merchant Shipbuilding Returns.
*includes Container Ships Terminal Operators Ltd.

From Table 3, it can be seen that world total shipbuilding capacity, in terms of compensated gross registered tons, is approximately 20 million tons.

17. It is extremely difficult to state, definitively, total world shipbuilding capacity for vessels of a given type and size. Assuming sufficient orders are available, shipbuilders have the option of building a number of small ships in a facility which can accommodate a single large ship. They may also build large ships in sections and join them afloat. Building docks may be used for repair, and vice versa, which can also increase or decrease capacity according to demand. It is reasonable to assume, however, that shipbuilders would wish to utilise their facilities to build the largest ships practicable since their facilities were presumably designed with that size of ship in mind. 1975 was a record year, in gross tonnage terms, for large tanker completions and also for total tonnage completed in the world. Since order books were full it is also reasonable to assume that shipbuilders were able to be fairly selective, with respect to the orders which they accepted, in order to maximise profitability. Ship completions for 1975, modified slightly to account for known expansion of facilities in the period 1975 to 1978, are used as the basis for estimating annual output of ships in five size categories specified in the Terms of Reference. Detailed figures are given in Table 12 and a summary is given in Table 4 overleaf:-

TABLE 4 - ESTIMATED ANNUAL SHIPBUILDING OUTPUT FOR SHIPS IN THE SIZE CATEGORIES SHOWN

Region / Size (dwt)	Developing countries in the Mediterranean*	All Mediterranean countries (inc. France & Spain)	WORLD (excl. USSR)
150,000 & above	2	18	130
20-150,000	19	55	488
10-20,000	1	7	160
1-10,000	22	110	784
less than 500	35	191	1024
TOTAL	79	381	2586

(*Albania, Algeria, Cyprus, Egypt, Greece, Lebanon, Libya, Malta, Morocco, Syria, Tunisia, Turkey, Yugoslavia).

The 79 ships which, we have estimated, could be produced annually by the developing countries in the Mediterranean are, on this basis, allocated as follows: Greece (29), Yugoslavia (25), Turkey (13), Egypt (5), Malta (6), Albania (1). Although it must be re-emphasized that the above figures can only be considered to be approximate, they do indicate the small share of world shipbuilding output which can be attained by shipyards in Mediterranean developing countries.

3.2.2. SHIPBUILDING DEMAND

18. The shipbuilding industry is still suffering from the extremely high growth rates of the late nineteen sixties and the beginning of the nineteen seventies. These led to an expansion of production facilities and capacity which, in retrospect, appear to have been excessive.

19. Shipbuilding, which is a labour intensive industry, is often centred on regions in which unemployment is higher than the national average and where the closure of a shipyard, and the effect this would have on the industries which depend upon it for survival, would be socially and politically undesirable. In order to preserve employment, a number of governments in developed countries have stimulated demand for new ships by offering cheap credit and/or subsidies to potential customers. Shipbuilders, in both developed and developing countries, have been forced to depress prices, to loss-making levels in some cases, in order to attract business. The net result has been a stimulus to demand, particularly from shipowners in developing countries, at a time when there is gross and long-term over-capacity in virtually every sector of shipping. Despite the many inducements which have been used to stimulate demand, the new order intake has continued to decline. World shipbuilding order books are now at their lowest level since 1965.

20. The decline of the world shipbuilding order book since 1974 is illustrated in Figures 2 and 3 . It will be seen that the ratio of ships not commenced to ships already under construction in October 1974 was 3:1 in gross tonnage terms and 1.3:1 in number terms. Comparable figures for October 1977 were 0.8:1 and 0.7:1. The new order intake in the first nine months of 1978, at 5.7 million gross tons was less than 44% of the total output of 13.1 million tons (Comparable figures for the first nine months of 1974 were 21.7 million gross tons of new orders received and a total of 22.7 million gross tons completed). We would expect the situation to deteriorate still further.

FIG.2 SHIPS ON ORDER AND UNDER CONSTRUCTION (GROSS TONNAGE)

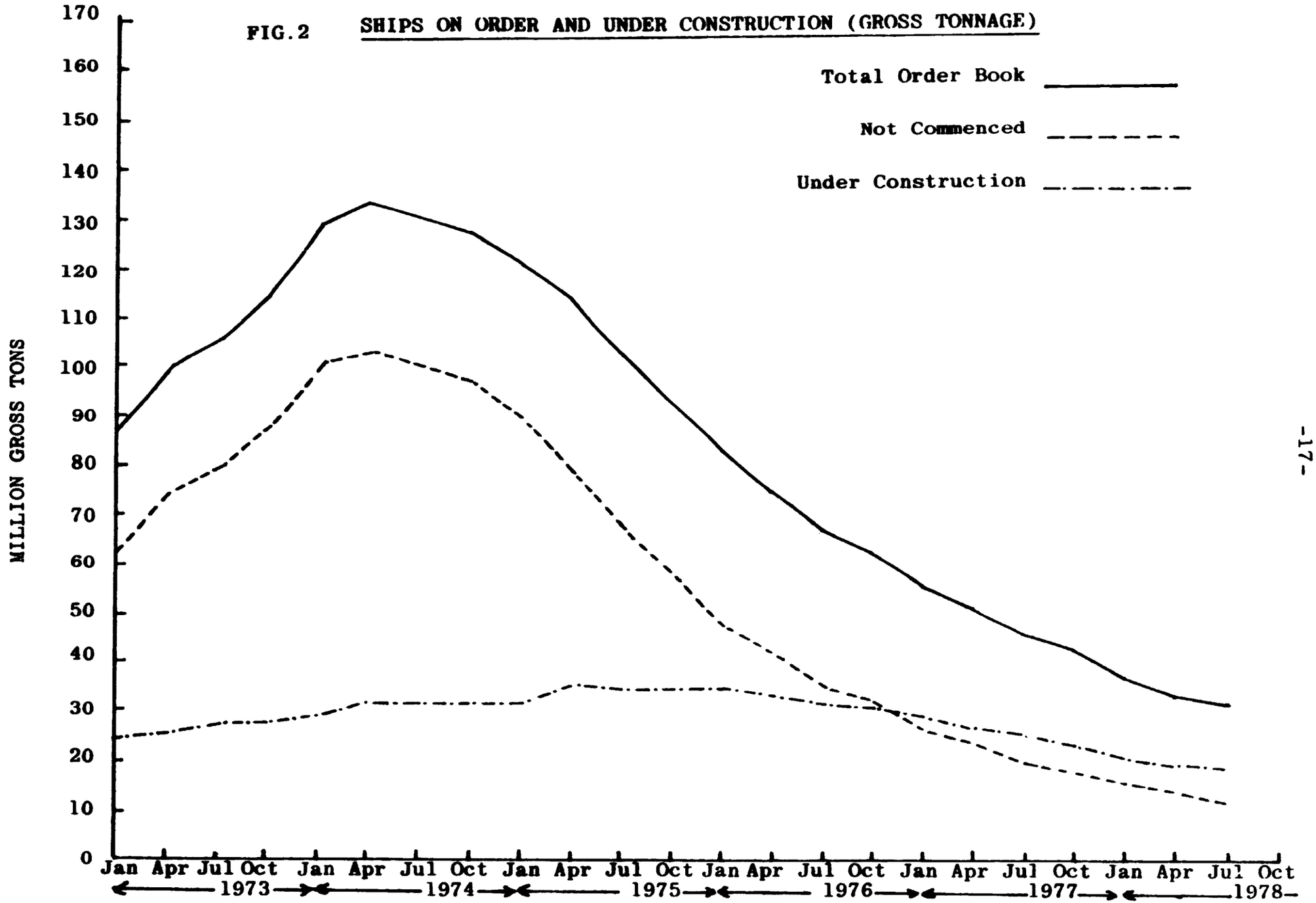
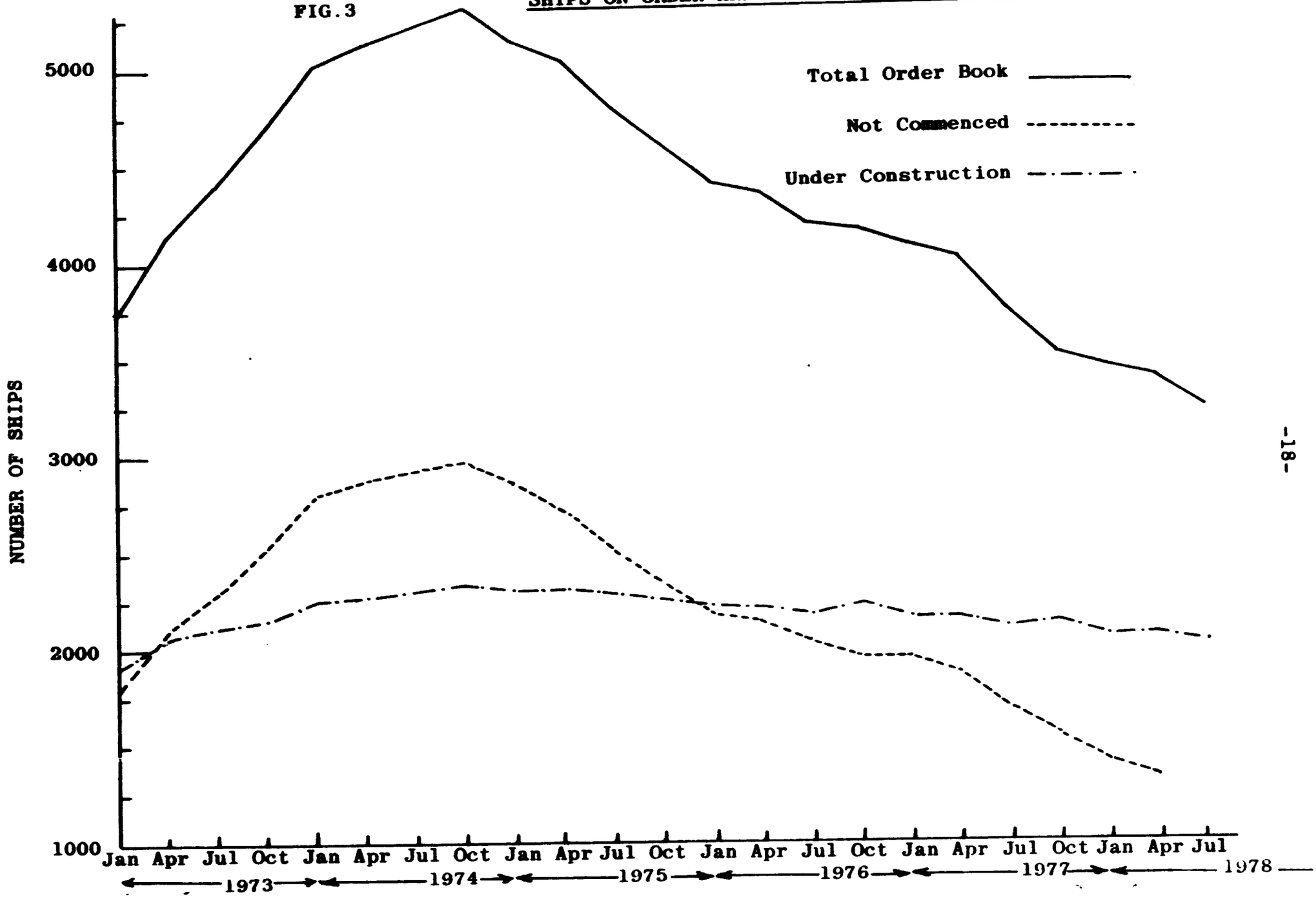


FIG.3

SHIPS ON ORDER AND UNDER CONSTRUCTION (NUMBER OF SHIPS)



21. New orders placed during the six month period up to 31st October are shown in Tables 5 and 6 for each of the five size categories specified.

TABLE 5 NEW ORDERS PLACED DURING THE PERIOD 1ST MAY TO 31ST OCTOBER 1978 BY SIZE

Dwt range	150,000 & above	20,000 to 50,000	10,000 to 20,000	1,000 to 10,000	less than 500	TOTAL
No. of ships	-	75	125	229	11	440

Source:- Fairplay International World Ships on Order

These above figures, which do not include Ferries, Passenger and Miscellaneous Vessels are made up as shown in Table 6.

TABLE 6 NEW ORDERS PLACED DURING THE PERIOD 1ST MAY TO 31ST OCTOBER 1978 - BY TYPE AND TOTAL DEADWEIGHT

Ship Type	Number	'000 Deadweight
Dry Cargo	228	1572.71
Bulk Carrier and OBO's	31	1164.50
RO-RO	50	260.33
Container Vessels	68	1176.51
Tankers	63	1259.41
TOTAL	440	5433.46

Source: Fairplay International World Ships on Order

Tables 5 and 6 show that current new orders are predominantly for dry cargo vessels, including roll-on/roll-off and container ships, in the 1,000 to 20,000 deadweight range.

22. No contracts for vessels over 150,000 deadweight were placed during the six month period in question. The figures are

not really surprising. "Lloyds Monthly List of Laid-up Vessels" for December 1978, showed that 279 tankers totalling 30.2 million deadweight were in lay-up of which 32 vessels totalling 4.0 million deadweight were combination carriers. Total excess capacity in the tanker sector, which takes account of slow steaming, excessive port time and the carriage of part cargoes in large ships was given as 142 million deadweight at mid-1978*. In the dry bulk vessel sector, Terminal Operators' research showed that the effective surplus, which includes vessels which are in lay-up, slow steaming, waiting at ports, carrying part cargoes and undertaking uneconomical ballast voyages, at mid-1978 was 2,523 ships with a total deadweight of 52 million tons representing approximately 30% of total supply. These figures include 1370 tramping tweendeckers with a combined deadweight of 12 million deadweight. Until a balance is achieved in the tanker and dry bulk sectors of the shipping markets and surpluses reduced, it is unreasonable to expect a demand for these vessel types. We expect that the switch from large tankers and bulk carriers to the more sophisticated liner type vessels with ultimately cause over-capacity in other sectors and that orders for the latter type of vessel will also dry up.

23. The outlook for special purpose and non-cargo carrying ships, such as accommodation barges, drill ships, pipelaying barges, ferries, dredgers, salvage vessels, buoy and lighthouse tenders, oil rig supply ships, tugs and tug/anchor handlers, seismic survey ships, oceanographic and research ships, diving

*From John I. Jacobs World Tanker Fleet Review

support ships, fishing boats, and fish factory ships, is more optimistic and we expect demand in this market to increase slightly. Reference to Tables 13 to 16 shows that output of these types of vessel, which are included under "Miscellaneous" has increased consistently over the four quarterly periods covered by the Tables. There are also indications that developed shipbuilding countries are showing increased interest in the construction of smaller special purpose vessels in order to compensate for the decline in other sectors.

24. Historically, shipbuilding industries have been assisted during their development stage or during depressed market conditions by the presence of a large or expanding shipping industry. Where necessary, governments have provided the necessary financial incentives to persuade owners to purchase at nome rather than in the world market. The preferred method of encouraging owners to buy at home was by making cheap finance and subsidies available to those who did and by placing tariffs and restrictions on imported ships. Japan, Brazil, India and Spain are all cases in point. There is a danger that owners can only purchase ships of the type and degree of sophistication available from domestic shipyards and that these may not be optimum for their particular operation. Brazilian owners particularly have complained that they had to take the ships which they were offered rather than the ones which they wanted. Nevertheless, a close connection between a shipbuilding and a shipping industry is generally mutually beneficial.

25. Participation by developing countries in the carriage of maritime cargoes, and hence their requirement for ships, is likely to increase substantially in the near future. Traditional maritime nations have now reluctantly conceded the right of developing

countries to participate in the liner trades. The United Nations Conference of Trade and Developme.t (UNCTAD) Liner Code, which has a cargo sharing provision - the so-called 40:40:20 Clause whereby countries will be entitled to carry 40% of the liner cargoes which they export and import - will probably be accepted in some form, although not necessarily in its entirety. It is now UNCTAD policy to seek "recognition of the rights of developing countries to an equitable participation in the carriage of bulk cargoes generated by their own trade and agreement on the measures needed for the implementation of those rights"* These policy recommendations will be on the agenda at the Fifth Session of UNCTAD to be held at Manila on 7th May, 1979. The implications of flag preference and cargo sharing agreements are discussed in greater detail on Page 42 It is sufficient to note at this point that the theoretical potential for developing countries to expand their shipping and shipbuilding industries under the protection of such agreements is enormous. While they export 61% of world seaborne cargoes they currently own less than 8% of the world fleet.

26. Once a shipbuilding industry has established itself at a national level only then does the decision have to be made as to whether the industry has a role to play in the international market. It is relevant therefore at this point to mention the merchant fleets of those Mediterranean developing countries to which this study is directed. Tables 17 and 18 show that Greece is the only country, of the 13 considered, which has a greater than 1% share of the world total in gross tonnage terms. Greece has 7.5% (29.52 million tons) of the total while Albania, Algeria, Cyprus, Egypt, Lebanon, Libya, Malta, Morocco, Syria, Tunisia, Turkey, and

*Merchant Fleet Development - Report by the UNCTAD Secretariat (UNCTAD/SHIP/127) Chapter VI. October 1978

Yugoslavia have only 2.37% (9.27 million tons) between them. Tables 19 and 20 show the number and deadweight of ships which are currently on order, from domestic yards and from overseas yards respectively for the countries listed above. The figures show that the majority of orders have been placed with overseas shipyards. There thus appears to be scope for owners to place more orders at home but that would be dependent on heavy investment in a new industry which would have to compete with chronic over-capacity in the world's existing shipyards. The total order book for the thirteen countries with which we are primarily concerned here represents approximately 7% of the world order book. Excluding Greece, the percentage is only 2.7%.

3.2.3. GENERAL CONSIDERATIONS

27. It will be apparent from the foregoing that shipbuilding supply is currently widely in excess of demand. We have estimated that the total capacity of the world's shipyards is approximately 20 million compensated gross tons. Figures for estimated world newbuilding demand vary depending on source, but the consensus of opinion is that it will be between 11.5 million and 13 million compensated tons in 1980. On this basis, cutbacks of between 35% and 42% of capacity are required.

28. Japan and all of the European shipbuilding nations, with the exception of France, are now seriously contemplating methods of cutting surplus capacity while causing the least social hardship to those employed in the industry.

29. In Sweden the Government have issued a directive to the four major state-owned yards that they must cut back their combined work force by 4,000, reduce capacity by 20% and take long strides in the direction of alternative products by 1980. In West Germany the Association of German Shipbuilders has warned that the industry must cut the work force by 8,000 employees over the next two years and that German Shipbuilders will have to reduce capacity by a third over the next year if the Government fails to provide aid*. The total work force engaged on merchant vessel newbuilding in West Germany numbered 32,400 in September, 1978.

30. Japanese yards plan to reduce capacity by 35% overall as follows: the biggest seven companies will reduce capacity by 40%, the next seventeen biggest by 30%, the next sixteen biggest by 27%, and the smallest twenty one by 15%. The net effect will be to reduce Japan's shipbuilding capacity from 9.8 to 6.4 million compensated gross registered tons by November 1979, a reduction of about 35%. The Japanese Government has set aside 96.5 billion Yen (approximately US $487 million) to pay for the scrapping of capacity. Money will be made available to all but the seven biggest companies who will have to finance the reductions themselves. Manpower and facilities will be transferred to non-shipbuilding activities wherever possible, but some of the smallest yards, who have least scope to diversify, will close and their work forces will be made redundant.

31. British Shipbuilders have presented the UK Government with four options in their Corporate Plan which is aimed at keeping losses within £45 million this year. The preferred option provides

*Association of German Shipbuilders. Report on the Structure of the German Shipbuilding Industry dated September 1978.

for a 35% reduction in capacity to 430 thousand compensated gross registered tons in 1980-81. About 12,300 jobs would be lost in merchant shipbuilding out of a total of 33,000 men currently employed in this sector if this proposal was implemented.

32. Shipbuilders in Western Europe and Japan are now in apparent agreement that capacity should be reduced by about 35% over the next two to three years. It remains to be seen whether the developing shipbuilding nations, South Korea, Brazil and Taiwan for example, will now curtail their expansion plans and increasingly aggressive marketing or merely exploit the gap left by the other countries. These countries are in the process of transformation from predominantly agricultural to mixed economies and their exports are growing at much higher rates than in the industrialised world. UNCTAD, on behalf of the developing countries, takes the position that developing countries' cargoes should be reserved for their national flag vessels. South Korea, accordingly, plans to expand its merchant fleet by 3.3 million gross registered tons, to 6 million, by the end of 1981. Brazil's shipbuilding programme for the period 1975-1979 provides for building 765 new vessels, of various types, with a total tonnage of 5.3 million deadweight. Both countries make it a policy to build most new vessel requirements at domestic yards. The yearly levels of newbuilding required for the home market will enable these countries to weather the current depressed shipbuilding market. When the international newbuilding market picks up they will be able fully to utilise their capacity.

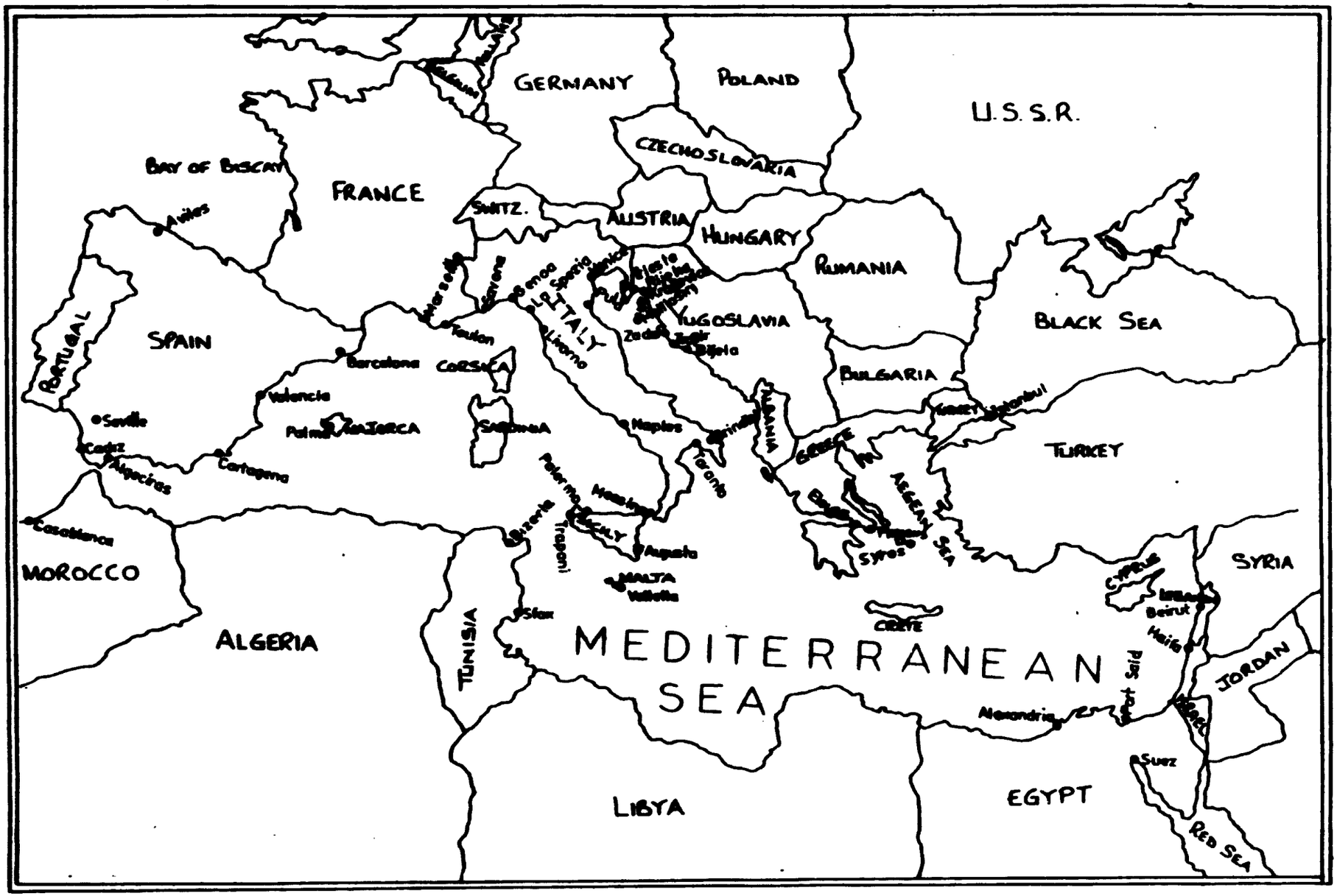
33. The situation is currently a very difficult one. We have placed considerable emphasis on present depressed market conditions and the problems faced by the shipbuilding industry in general. It is against this background that the Mediterranean developing countries must assess the viability of their own operations, both existing and proposed.

3.3. SHIPREPAIRING

3.3.1. SHIPREPAIR - SUPPLY

34. There is no accurate basis on which to quantify the potential output of the world's ship repair yards. Drydocks and slipways may be put to a variety of uses ranging from routine maintenance and painting to major repairs or conversion work. Length of stay in drydock varies enormously depending on the nature and extent of the work to be carried out. In the absence of any other suitable yardstick we have limited our investigation of ship repair capacity to ascertaining numbers of facilities in four size categories. Figures are given for individual countries, grouped according to geographical proximity, in Tables 21 to 27 A world summary is given in Table 28. A more detailed analysis, utilising ten size categories, is given for Mediterranean countries in Table 29. Figure 4 shows the distribution of ship repair facilities, with capacities in excess of 1,000 tons, throughout the Mediterranean.

35. We have identified a total of 1480 operational drydocks, floating docks and slipways throughout the world and a further 17 which were not fully operational at the time of writing (December 1978). Of the latter, 10 are designed to accommodate ships of 150,000 deadweight or above. There are a total of 156 drydocks, floating docks and slipways in the Mediterranean of which 6 were not operational. Of the latter, 5 will be capable of accommodating ships up to 500,000 deadweight. Reference to Figure 4 shows that a large majority of the facilities in the Mediterranean are concentrated in countries on the Northern Coast.



•Places with repair facilities with capacities in excess of 1,000 tons

FIGURE 4 - Distribution of Shiprepair Facilities with Capacities in excess of 1,000 tons in the Mediterranean

3.3.2. SHIPREPAIR - DEMAND

36. As in the case of supply, there is no accurate basis on which to quantify the total ship repair market or the market share available to individual geographical regions. Shipping companies have considerable freedom of choice as to the port, country and often region in which planned maintenance and repair shall be effected. The main competitive factors affecting the owners' choice of repair yard are price, speed and reliability of delivery, location of repair yard (the cost of diverting is high, particularly when freight rates are also high) and quality of repair.

3.3.3. SHIPREPAIR - FACTORS AFFECTING SUPPLY AND DEMAND

37. While it is not possible to quantify supply of and demand for ship repair capacity, it is possible to identify certain factors which have an influence on the market and to assess, in qualitative terms, the current state of the market. The factors include:-

(a) Expansion of capacity

38. A significant number of new ship repair facilities have been created in the last 10 years. This expansion partly results from a legitimate desire of developing countries to participate in the exchange of goods in their economy with their own fleet and moreover to maintain their fleet in their own country. More frequently, expansion has resulted from purely commercial considerations whereby countries have developed a shiprepair industry which is based on a geographical advantage and low wage costs but which has no connection with the national requirement for ships. The

Iberian Peninsular, for example, which is adjacent to major tanker and large bulk carrier routes servicing Europe, has become a major repair centre for ships engaged on these passing trades. The capacity of 3.8 millions deadweight in this area was virtually wholly created in the ten years from 1966 to 1976 and is enormous relative to the size of the Portuguese and Spanish fleets. Singapore had only three large drydocks ten years ago, (2 x 100,000 deadweight a 1 x 90,000 deadweight capacity). There are now 8 large drydocks including 2 of 400,000 deadweight and 2 of 300,000 deadweight capacity. The total increase in capacity has been from 430,000 to 2.2 million deadweight i.e. five fold. It is likely that repair facilities in South East Asia, and particularly in Singapore, will continue to develop. Singapore is ideally placed at the "cross-roads of international trade routes which are expanding. Repair prices in Singapore are up to 40% lower than in Japan.

39. Further increases in capacity have resulted from the increased oil revenues of producing countries. In the Arabian Gulf, where no large repair docks existed prior to 1976, there was a total capacity of 2.3 million deadweight under construction in 1976. While these facilities were primarily intended to cater for the increased numbers of ships visiting Arab ports it was also hoped that they would attract business away from the Mediterranean ports and Singapore. Outstanding among the new facilities is the Arab Shipbuilding and Repair Yard (Asry) sited at Bahrain and the Dubai Drydock Company's facility at Dubai. The repair complex at Bahrain, which became operational in October 1977, includes a 500,000 deadweight capacity dock and a training school which, eventually, will be able to train 200 persons a year. The complex at Dubai comprises three docks with capacities of 350,000, 500,000 and 1,000,000 deadweight respectively. Construction work at Dubai should be completed

ready for a start early in 1979. The huge task of building up a 3,000 strong workforce might present a problem and could cause delays.

(b) Extension of docking intervals and reduction in time spent in dock

40. Parallel with the building of bigger and faster ships, shipowners have been seeking ways of extending intervals between docking and of reducing the time spent in dock. Classification Society Rules now allow for "in water" surveys to be carried out and ships may be inspected and cleaned in a floating condition. Stern tube seals are being continuously improved and, as is the case with rudder bearings and rudder packing, can be changed without docking. Alternated underwater cleaning and out of water painting of shell plating together with significant increases in the active life of paint coatings and cathodic protection have made an extension of the drydocking interval practicable. Classification society rules now permit 30 months between drydocking for ships coated with suitable paint systems. Additionally it is now possible for classification societies' surveys to be carried out afloat, in lieu of a routine drydocking, and for vessels to complete a full five years afloat.

41. En-voyage repair teams are available to carry out work which was traditionally done in port. En-voyage shiprepair is very often complementary to in-yard repair and a number of the major shiprepair yards now offer a "flying squad" service (Rhine-Schelde-Vérolme and Lisnave are examples). The advantages to the shipowner of carrying out repairs during the normal course of a

voyage are reductions of time out of service and the avoidance of drydock charges. En-voyage ship repair companies which are not associated with a shipyard do not have the overheads of traditional yards and are in a position to be more flexible with regard to workforce size.

(c) Transfer of shipbuilding facilities to repair activities

42. Although this practice is not apparently widespread, Spanish yards are, wherever possible, being adapted to repair activities to counteract the shortage of new orders. The Astilleros Espanoles (AESEA) Group's original shipyard, at Cadiz, has now become a principal shiprepair centre capable of handling all types of repairs on a wide variety of ship types ranging between fishing boats to large tankers.

43. Each of the three factors mentioned tends either to increase supply or to depress demand and each has a negative effect on the ship repair market. Factors which tend to increase demand are:-

(d) Conversion work

44. Changing markets, depressed second hand prices during periods of under-employment, high costs of custom-built new tonnage and the advantage of being able to put a ship into service relativel quickly - all are factors which will influence an owner's decision on whether to buy new ships or to convert existing ones. There are three basic types of conversion which may be summarised as follows:-

OTHER USE - Changing vessel type

SAME USE - Increasing (or decreasing) cargo capacity

" - Modernisation (fitting improved cargo handling or access equipment for example)

45. In the current market conditions, shipowners are showing considerable interest in the conversions of various ship types. Conversions which have been carried out include:-

- Tankers and bulk carriers to RO-RO and container ships
- General cargo ships to drill ships
- Stern trawlers to offshore supply boats
- Offshore supply boats to diver and submersible support ships

(e) Statutory requirements for improving safety and reducing risks of pollution

46. Important new measures to improve the safety of oil tankers and to help prevent pollution of the sea by ships have been adopted by the February 1978 IMCO Tanker Safety and Pollution Conference. Many of the measures agreed to have now been included in Annexes to Protocols to two major Conventions - the 1973 Marine Pollution Convention and the 1974 Safety of Life at Sea Convention. Among the measures adopted were a number which, when they come into force, will affect new and existing tankers. If, as seems likely, the IMCO proposals are adopted and target dates for implementation met, many owners will be faced with the question of whether to convert existing tonnage or purchase new ships. For crude carriers of 70,000 deadweight and above, an Inert Gas System will become mandatory two years after the Protocol to the 1974 Safety of Life at Sea Convention comes into force (target date June 1979)

and two years later for crude carriers of 20,000 to 70,000 deadweight. Inert Gas Systems will be required on existing product carriers of 70,000 deadweight two years after the Protocol to the 1974 Safety of Life at Sea Convention comes into force and two years later for product tankers of 40,000 deadweight and down to 20,000 deadweight for ships which are fitted with high capacity washing machines. This is only a very brief summary of the IMCO recommendations which affect existing tonnage and is included to illustrate how the growing requirements of legislation may generate work for en-voyage and in-dock repair companies.

47. There is a feeling in some government and shipowning circles that the IMCO recommendations do not go far enough. Mandatory segregated ballast tanks for existing tankers, for example, would not only reduce the risk of pollution but would also reduce tanker surpluses appreciably. Retrofitting of segregated ballast tanks to existing tankers would also provide work for repair yards which would be considerably in excess of that which is required for fitting Inert Gas Systems alone. The cost of fitting segregated ballast tanks would be high and time for conversion would be measured in months rather than weeks. To be fair and workable, compulsory segregated ballast tanks would have to be universally accepted by all governments who would probably have to bear a majority of the costs of conversion.

48. Although there was considerable support for the stronger measures proposed, these were not adopted by IMCO. The USA, however is introducing stricter measures to reduce the risks of pollution of its coastlines. The Port and Tanker Safety Act of 1978, which was signed by President Carter on October 17th, 1978, will have

serious implications for the owners of product tankers who wish to trade to US Ports. Included in the Act are requirements that existing product carriers of 40,000 deadweight and above be fitted with segregated ballast tanks or operate with clean ballast tanks by June 1st, 1981. Existing product tankers of 20,000-40,000 deadweight shall be fitted with segregated ballast tanks or operate with dedicated clean ballast tanks by January 1st, 1986 or by the time they are fifteen years of age, whichever is later. It remains to be seen whether other countries, similarly concerned with the risks of pollution damage as a result of spillage from tankers, will also take unilateral action to afford themselves greater protection than that provided by the IMCO proposals. Such measures will provide additional employment for repair companies and add impetus to the scrapping of older tankers and their eventual replacement by new ships, built to the minimum standards required by legislation.

(f) Maintenance of offshore exploration, development and support ships

49. An important and expanding sector of demand is that of maintaining and repairing "hardware" employed in the offshore oil and gas industries. There is potential work in this sector for drydocks of all sizes and particularly for those in areas which are adjacent to offshore exploration production fields.

50. Despite the factors mentioned, which are having a positive and beneficial effect on the shiprepair market, supply still exceeds demand in this sector. The situation will further deteriorate as facilities which are now planned or under construction become operational, particularly if redundant shipbuilding facilities are

also used for shiprepair work on a large scale. Shiprepair prices reflect a bitterly keen competition, worldwide. According to the Institute of London Underwriters figures, prices in this sector rose just 4.6% in 1977 on average as against 18% in 1976. Table 7 is an index of repair costs in major centres worldwide and shows that Spain, Taiwan, Portugal and South Korea, in that order, had the lowest repair costs of the countries which are included in the Table. Clearly any shiprepair facility in the Mediterranean would have to regard Spain and Portugal, with their low costs and established reputations, as major and formidable competitors.

3.4. SHIPREPAIRING IN MEDITERRANEAN DEVELOPING COUNTRIES

51. We have made no attempt, at this stage, to make a detailed appraisal of repair yards in Mediterranean developing countries or to comment on their existing and potential output and capacity. In the absence of published data, no one is better placed to obtain information of this type, which will provide an interesting basis for discussion at the "Workshop", than the representatives of the participating countries. We would suggest that each delegate provides information, for his own country, as follows:-

(1) number of ships drydocked per year
(2) total gross tonnage of ships docked per year
(3) total dock occupancy, days per year
(4) numbers of ships docked for domestic and overseas customers respectively as percentages of total number of ships

52. Additionally, information regarding numbers, types and nationalities of ships trading to ports in the countries concerned are needed as an indicator of the potential or available market.

TABLE 7 INDEX OF SHIPREPAIR COSTS - WORLDWIDE

COUNTRY OR REGION	CURRENCY = US $	INDEX 1972	INDEX AT JUNE 30TH 1978
USA			
Atlantic Coast (excl. New York/Boston)		100	176.0
New York/Boston		120	212.7
Gulf Coast		98.4	178.5
Pacific Coast		114.5	202.9
Great Lakes (USA)		117.3	205.9
CANADA			
Great Lakes		105.6	186.4
East Coast			177.3
West Coast		114.5	196.6
UK	£=1.9195	60.8	142.4
HOLLAND	Guilder=0.4415	88.0	179.9
BELGIUM	Franc=0.30349		
FRANCE	Franc=0.213		
Atlantic Coast		81.0	157.1
Med. Coast		81.0	160.4
W.GERMANY	DM=0.4768		
Hamburg/Kiel		83.0	184.8
Bremen/Emden/Bremerhaven		83.0	194.0
DENMARK	Kroner=0.1727	85.3	172.3
NORWAY	Kroner=0.19505	83.2	167.9
SWEDEN	Kroner=0.2130	85.0	154.6
ITALY	Lire=0.00144	85.0	159.0
SPAIN	Peseta=0.1235	63.0	116.1
PORTUGAL	Escudo=0.0249	60.0	124.8
MALTA	£M=2.55	60.0	133.9
GREECE	Drachma=0.0283	70.0	117.9
JAPAN	Yen=0.00417	65.0	167.9
HONG KONG	HK$=0.2190	65.0	132.0
SINGAPORE	S$=0.429	70.0	132.6
MALAYSIA	Dollar=0.4235		130.6
TAIWAN	NTS=0.0275	47.0	119.4
KOREA	Quoted in US$		127.0
INDIA	Rupee=0.123	44.2	156.1
SOUTH AFRICA	Rand=1.1535	92.0	150.4
AUSTRALIA	A$=1.144		163.6
CURACAO	NWI Guilder=0.56	98.0	179.7

Source: United States Salvage Association (Reproduced from "Shipcare International Volume 10 No.7 July 1978)

For exchange rates other than those shown:

Index at new exchange rate = Index at June 30th 1978 x $\frac{\text{Exchange rate shown}}{\text{New exchange rate}}$

4. GENERAL CHARACTERISTICS OF SHIPBUILDING AND SHIPREPAIRING INDUSTRIES

4.1. GENERAL

53. For any given shipbuilding development situation, the basic criteria of manpower availability, potential competition for manpower from other industries, degree of manpower skill, level of organisational expertise, local cultures and traditions and local climate provide the basis for overall design considerations. The nature of the ship production system and the types of technology which are to be employed will be very much dictated by conclusions reached on these criteria. When examining shipyard developments worldwide, it is evident that no two given solutions, to apparently similar production requirements, are the same. Each particular shipbuilding development has its own characteristics and notable features which, logically, are based upon these established initial criteria. The nature of a ship production system should be tailored to the special requirements of a country or even to a region within the country. It is not possible therefore to generalise with regard to the requirements of each of the thirteen countries with which we are primarily concerned here. The following is intended as a basis for discussion rather than as a set of rules and guidelines which would be applicable to every situation.

4.2. MANPOWER

54. Shipbuilding was traditionally a labour intensive industry. Improvement in ship production systems has lagged behind that of other industries, probably because of the custom-orientated

nature of the products, the complex structures involved and their large size and the lack of uniformity of ships. In the late 1960's and early 1970's shipbuilders in developed countries, and Japan in particular, were faced with rapidly escalating labour costs and labour shortages in some instances. The search for methods of increasing output and improving efficiency through the substitution of technology for manpower received new impetus. To implement the changes which were required involved a complete change, not only of working practices, but also of attitudes. In order to improve productivity, the shipbuilding process was reorganised through work simplification, with many kinds of fabrication organised into a few patterns. Various major components were classified into groups according to type of operations and the sequence of operation organised for each group. As a result, complex assemblies were classified into operational sequences each consisting of several simple operations. In this way, workshops were re-organised from a craft-organised to a process-organised system through a division of labour and specialisation in the production system. By specifying operation sequences for each pattern, repetitive motion patterns became possible at each sequence. The development of specialised jigs and tools and special purpose machines was accelerated and automation became a reality.

55. A few Japanese and Swedish yards came close to achieving full automation. Many others who tried were less successful. Nevertheless, the lessons learnt and the technology developed can be used to advantage by those now in the process of developing their shipbuilding industries. The degree to which technology is substituted for labour should reflect employment needs, the level of skill of the available workforce, and the relative costs of manpower and machinery. The following points, however, are relevant:-

(a) it is easier and more efficient to incorporate advanced technology into a facility at the design stage. Modernisation of an existing facility may result in compromises due to shortages of space and to the reluctance of the workforce to accept methods which are new to them.

(b) a cheap and abundant labour supply does not necessarily imply that the ships produced will be cheaper than similar ships produced in high cost countries through efficient use of technology. It may be necessary therefore to reach a compromise solution and to temper the requirement for generating employment with the requirement to compete in world markets. This will, of course, depend on the product mix, the skill and discipline of the workforce and on government policy with respect to subsidies and protectionism for the industry.

(c) the success of the venture will largely depend on the quality of thought, effort and direction, and attitudes which prevail. The total workforce needs to understand what has to be done and to do it with conviction. One of the greatest barriers to progress in shipbuilding is caused by resistance to change. That resistance may be directly attributable to fear or to ignorance, but in either case it generally stems indirectly from poor communication between management and the shop floor. In this context, the importance of the people who provide the interface between shopfloor and management - the foremen and supervisors, cannot be ignored. Considerable emphasis should be placed on the selection and training of staff at this level. They are vital to the efficient running of the organisation, but are too often overlooked when organisational structures and training programmes are being developed.

4.3. THE CYCLICAL NATURE OF SHIPPING MARKETS

56. The supply and demand situation with regard to the shipbuilding and shiprepair markets was discussed in Part 3 where it was suggested that there is a trend to more specialised ship types. In the late 1960's and early 1970's shipbuilders were able to attract orders for large numbers of a single ship type - tankers, for example. At that time, the shipbuilders who were particularly successful were those who constructed their facilities to suit specific ship types. Builders are now having to seek methods of providing a flexible product mix, in terms of type and size, which is also capable of making best possible use of the resources which are available. Many of the modern yards, having specialised on the larger ship types, have been disproportionately affected by the current slump in demand for such types.

57. These extremes typify the cyclical nature of shipbuilding demand which requires that builders be prepared to adapt to rapidly changing situations. The other problem, which the shipbuilder faces in alternating boom and slump conditions, concerns the length of his order books. In boom conditions, when inflation makes it impossible to forecast cost escalation beyond the short term, the happiest builders are those with the shortest order books or those who have long term contracts with escalation clauses. In slump conditions the builders with long order books, which will guarantee work into the future, have the advantage. The problem of cost escalation is secondary to employment while competition ensures that prices remain fairly stable anyway.

58. The problems which are associated with peaks and troughs in supply and demand can result in a commercial and/or financial relationship between an owner and a builder being mutually beneficial Too often, it seems, there is an unhappy relationship. Either there is a shipbuilding slump, in which case the builders are pleased to accept orders at any price, or there is a boom and the owners are looking for a berth at any price. It is in fact in the interest of both sides to ensure that the shipbuilder can maintain a steady, planned programme. Obviously the terms of any owner/builder relationship, if they are to be of mutual advantage, are complicated. Nevertheless, they can be negotiated.

4.4. PROTECTIONISM

59. Protectionism, in one form or another, is commonplace in the shipping, shipbuilding and shiprepairing industries. A national merchant fleet is believed to be of vital economic and security interest to many of the world's governments. In order to ensure that these interests are upheld, governments have found it necessary to support their fleets through aids and subsidies. These aids may include the following, although their forms vary*:

- Operating subsidies
- Construction subsidies
- Trade-in allowances
- Official low interest loans
- Interest subsidies
- Official loan guarantees
- Accelerated depreciation

*Maritime Subsidies US Department of Commerce May 1974

- Tax free reserve funds
- Duty free imports of materials needed forship construction
- Cargo preference schemes
- Cabotage restrictions
- Incentives to scrap and build
- Laws requiring the construction and repair of national flag ships only in domestic shipyards for operation in a nation's foreign and domestic trades.
- Laws specifying that materials and component parts for the construction of ships and their maintenance and repair be purchased domestically.

The majority of the aids listed above are applicable to the shipping rather than shipbuilding and shiprepair industries. They are included here because their availability to an owner is very often dependent on his ordering the ships from domestic yards. Provision of incentives which persuade an owner to build ships, at a time when he might otherwise be reluctant to do so, can be mutually advantageous to the owner and to the builder with whom the orders are placed.

60. A problem with subsidies is that they tend to be self-perpetuating. If owners receive construction subsidies which provide cheap tonnage and guarantee employment for local shipyards, there is no real incentive for those yards to cut costs and improve efficiency in order to be competitive in international markets. Similarly, construction and operating subsidies and cargo preference schemes may enable operators with lower standards and higher operating costs to compete successfully with more efficient foreign flag ships.

61. Many countries would like to apply the principle of free and fair competition in shipping and shipbuilding. In practice, no government can ever allow its fleet or its shipyards to be independent of national goals and preferences. Maritime nations, who have traditionally advocated government non-intervention, are now having to take measures to safeguard their interests against discriminatory practices exercised by other states.

62. It is unlikely that an infant shipbuilding industry could survive, in the present economic climate, without government assistance in one form or another. It must be emphasized, however, that subsidies may be used to conceal inefficiencies and they may result in retaliatory measures from other states.

5. PROMOTION OF SHIPBUILDING AND SHIPREPAIRING IN DEVELOPING COUNTRIE

5.1. AN INDUSTRIAL BASE

63. The shipbuilding and shiprepairing industries are heavily dependent upon all industrial sectors, not only for the inputs which are directly required for ship construction and repair but also for the "back-up" systems necessary for the day to day running of the operation - transportation, power, fresh water and communications for example.

64. A shipyard's ability to use locally produced steel will depend largely on cost and availability. Steel for shipbuilding is required in a variety of special grades and sections, while quantities required are relatively small, as a proportion of total output. It is unlikely therefore that a viable steel industry could be established or maintained if it had to depend solely on maritime industries for its outlets. In the United Kingdom, for example, only 3.3% of the British Steel Corporation's output goes to the shipbuilding and marine engineering industries.

65. The decision on whether to make or buy components is also fundamental. It will not only affect production costs but will also determine labour skill requirements and training programme development. It is generally uneconomical to make the machinery and outfitting components in the yards for small production runs at a single yard or at a group of yards. In most cases machinery and equipment are manufactured outside the yards by independent vendors.

Locally produced components may be more expensive than those which can be imported from major equipment suppliers in industrialised countries, who can use mass production techniques. A further obstacle to local production is that shipowners very often specify a particular product which they know and trust and will not settle for a local approximation. A compromise solution, which provides the shipowner with the product he wants, avoids freight and import charges and makes use of local labour, is to encourage companies in the developed countries to establish a local base. A joint venture between such a company and a local manufacturer can be mutually beneficial.

66. If components are not manufactured locally, then it is essential that sources of cheap and reliable imports are identified. Regardless of detailed policies concerning the use of locally produced steel and components, a local industrial infrastructure is an important adjunct to shipbuilding and shiprepairing activities An industrial and engineering environment makes available a range of labour and subcontractor skills, permits economies of scale which could not be achieved with a single industry, and local industrial growth will attract further trade and hence ships to the area.

67. In this context the possibility of establishing an integrated industrial development area might be considered. In addition to shipbuilding and repair facilities and associated industries, the complex might include a number of other, complementary, industrial plants and interdependent processes. If the industries were all sited close to main trade routes and with easy access to deep water, so that ocean-going vessels could tie

up alongside, the maritime industries would be in a position to provide repair and drydock facilities to ships trading to, and passing through, the region. They would also benefit from an ability to receive components and raw materials by sea for offloading close to the point at which they would eventually be used.

5.2. SKILLED LABOUR

68. The problem of obtaining suitably qualified and experienced personnel is a difficult one for countries where experience of modern high technology shipbuilding is limited. At the higher levels, where people with managerial and technical skills are required, it may be necessary to rely extensively on expatriates in the early stages. Portugal, for example, has had to make extensive use of foreign graduates in naval architecture. To rectify the situation and to obtain suitably qualified men, the University of Lisbon is now taking Portuguese mechanical engineers and putting them through a conversion course in Naval Architecture. To further supplement their "in-house" expertise, Estaleiros Navais de Setubal (SETENAVE) concluded "knowhow" agreements with Eriksberg and Kockums of Sweden and the Rhine-Schelde-Verolme Group of the Netherlands. Their partners in Scandinavia, who are also share-holders in Estaleiros Navais de Lisboa (LISNAVE) have supplied expertise which has enabled SETENAVE to adapt ship designs from other European yards to suit their own production line facilities. Assistance has also been provided by Lloyd's Register of Shipping. In the next phase of development, SETENAVE intends to develop its own designs not only to attract a wider range of clients but also to encourage Portuguese manufacturers to break into the marine

field. One firm, the nationalised steel concern Equimetal, will be able to centralise the production of such items as windlasses, auxilliary machinery, heat exchangers, pressure vessels, boilers, valves, fairleads and pumps. Manufacture of ship quality steel is now planned for 1983 to replace the present supplies from Japan and Scandinavia.

69. This example illustrates how a developing shipbuilding nation has been able to draw on foreign expertise and materials during the initial stages of development and to progress in a planned manner towards self-sufficiency. Another example of co-operation between a developed and a developing shipbuilding industry is the technical assistance in design which Ishikawajima Do Brazil - Estaleiros (ISHIBRAS) has received from its parent I.H.I. Developing countries have also been able to build ships under licence from European yards. Austin and Pickersgill's licensing agreements with Hellenic Shipyards in Greece, with CCN in Brazil and AFNE in Argentina is an example. Govan Shipbuilders' agreement with Hyundai in South Korea for building their "Kuwait" class cargo ship is another.

70. The policy of granting building licences or other assistance to other companies is always controversial. While it is probable that such agreements could be reached, even in today's economic climate, it must be realised that shipbuilders in developed countries are not going to enter in agreements which will merely assist developing countries to compete with their own yards. They will understandably require an adequate recompense for any investment they make whether this investment be in the form of manpower, money, expertise or equipment.

71. It is extremely unlikely that developing countries will be able to generate competitive designs and build them cost effectively, using their own resources, in the early stages. As stated previously good designs can be obtained either from established yards or from consultant naval architects. We feel therefore that it is unnecessary, in the early stages of development, to initiate university and other courses which are intended to produce scientists and academics for the maritime industries. Training schemes should be tailored to provide the skilled craftsmen, foremen, and supervisors who will be directly involved in the ship construction and assembly process.

5.3. A MARKET FOR THE PRODUCT

72. The chronic over-supply of tonnage which now exists in many sectors of the shipping market was discussed in detail in Part 3 from which it is readily apparent that it would be extremely difficult for "infant" maritime industries to compete internationally at this time. Shipbuilders and shiprepairers will therefore have to rely extensively on their domestic markets to provide the business necessary to sustain growth during these difficult times. The market-place for shipping, however, is also international and shipowners have to compete on that basis. While most owners would like to support domestic industries, particularly in troubled times, they also have to find markets for their services and the ability to do so depends on their costs being competitive and on their ship designs being appropriate to the trades.

73. The market, of course, is not free for either the shipbuilder or the shipowner. The supply-demand pricing mechanism only applies after many factors, including governmental action, have distorted the market. If, as is likely, domestically built

ships are more expensive than imported ships in the early stages of development and if, as is also likely, those ships are going to compete in the markets where rates do not always truly reflect operating costs due to government intervention, then some form of protectionist arrangement on the part of the developing country may be required. This protectionism could take the form of subsidies or flag preference. A list of aids which have been used by governments, (and which are still being used in some cases), was given in Section 4.4. above where the problems associated with such policies were also discussed.

74. The interdependence of shipbuilding, shiprepairing and shipowning and their joint dependence on a strong domestic market cannot be over-emphasized. An example of just how they are related and how each can be used to provide growth for the others has been provided by Brazil.

75. "The basic goals of Brazilian policy have been to stimulate external trade and to obtain increasing participation in maritime transport, thereby improving the balance of payments position from two sources. These policies provided the motive force for the process of growth and expansion in shipping and shipbuilding." The large domestic shipbuilding programme in Brazil which tied Brazilian owners to domestic yards (and which was referred to in Paragraph 32) enabled shipbuilders to reduce cost levels and gain efficiency which made them more competitive in international markets. "This led to export orders being received which not only made a further contribution to the balance of payments position

but resulted in a gain in prestige in the international market".* Brazil, however, has certain natural advantages not enjoyed by the majority of countries. Brazil is a major exporter of mineral ores, soya beans, coffee and grain. Offshore oil deposits are now being developed.

76. It is realised that few developing countries will have similar advantages, and that development of maritime industries will therefore need to be on a more modest scale. Nevertheless, the Brazilian example illustrates how the maritime industries are interdependent and how a strong and tied domestic shipping market can be used as a springboard to successful competition in international shipbuilding markets.

5.4. ACCESS TO CAPITAL

77. Availability of initial capital for the development of shipbuilding and ancilliary industries may be a major problem for developing countries. Shipbuilding expansion cannot be resolved on a "step by step" basis. Major decisions of this sort require the commitment of large amounts of resources in advance and long before it becomes known whether the decisions made were right.

78. Before the geometry of the facility can be evolved it is clearly necessary to define the nature of the ship repair and/or production system to be adopted. This will require answers

*"Shipbuilding Development in the Non-Traditional Shipbuilding Countries: The Brazilian Case. Paper presented by Mr. Paulo Ferraz. Seatrade Money and Ships Conference 1976.

to fundamental questions such as:

- Who are the potential customers?
- How are ships to be constructed/repaired? In a dock? On a shipway?
- In a building facility, to what extent will hull sections, blocks or units be outfitted prior to erection?
- To what extent will the manufacture of machinery and components be accomplished and rationalised within the envisaged facilities?
- How much environmental protection is considered desirable?
- To what extent is future expansion of the facilities to be allowed for?

79. To obtain answers to these, and many other questions, it is necessary to spend a great deal of money on research, planning and design even before construction of the facility is commenced. It is likely that the knowledge and experience necessary to research and implement the expansionary measures will not be available locally. The expertise might be acquired by importing expatriates with the requisite skills, by soliciting aid from developed countries or by entering into a partnership arrangement with an existing shipbuilder in a developed country. Each of the possible alternatives will result in additional expenditure of foreign exchange, and the amount involved will be directly proportional to the scale and complexity of the expansion.

80. The requirement for capital does not end when the facility becomes fully operational. As stated in Section 5.3., it is likely that domestically built ships will be more expensive than imported ships especially in the early years. Capital will also be required to provide the construction and/or operating

...ners which will prov...

incentives to purchase or repair ships "at home".

81. It is essential that sufficient capital and expertise is available to the shipyards for them fully to research and implement their proposed developments. There is, of necessity, a speculative element involved and there is no guarantee of success. Experience in developed countries has shown, however, that the allocation, by Governments, of large sums of money on a piecemeal basis to the shipyards, to overcome perceived crisis situations, is rarely successful in the longer term. Private risk equity should be involved if the cost-effectiveness of the enterprise is to be maximised.

6. SHIPREPAIR

6.1. GENERAL

82. Shiprepair is, in many ways, independent of shipbuilding and of a domestic shipping industry. There may be circumstances therefore where it may be advantageous to consider shiprepairing as a separate entity and without reference to other maritime industries.

6.2. DISTINGUISHING FEATURES OF SHIP REPAIR VIS A VIS OTHER MARITIME INDUSTRIES

83. Differences between shiprepair and shipbuilding include:

(a) Shipbuilding may be undertaken well away from major international trade routes. Shiprepair is likely to be most successful where major international trade routes pass the location, (e.g. Aden, Bahrain, Colombo, Lisbon, Malta, Port Said, Singapore).

(b) Although shiprepair requires essentially the same skills as shipbuilding, the emphasis is more on steelwork and engineering and less on outfitting. Drydocking, either for routine survey or for emergency repairs, often involves the use of unskilled or semi-skilled labour for scraping, cleaning and painting, etc.

(c) With the possible exception of ship conversions, shiprepair involves very little basic design work.

(d) Because of the international nature of shipbuilding, yards in one country may be greatly affected, if indirectly, by government

intervention, fluctuations in freight markets, new technologies and the fortunes of a few customers in countries with which they have no direct links. While shiprepair is not totally insulated from international events, the industry is not affected to the same extent as shipbuilding. Competition between shiprepair facilities tends to be geographically local rather than international since owners will normally use facilities which are close to, or en route to, their normal ports of call. Problems which arise are therefore likely to be more amenable to solutions at a local or sub-regional level.

6.3. PREREQUISITES FOR A SUCCESSFUL SHIP REPAIR INDUSTRY

6.3.1. A DOMESTIC MARKET

84. It is generally accepted that, all things being equal, shipowners will prefer to repair their ships in home ports. This saves valuable overseas currency, overcomes difficulties of language and provides the crew with opportunity for home leave without incurring excessive travelling expenses. A healthy domestic ship-owning industry is therefore of considerable benefit to a shiprepair facility.

6.3.2. TRADE AND PORT ACTIVITIES

85. The volume of trade has a direct bearing on the number of vessels using a port and these will provide a potential locally based source of work for shiprepairers. Ports play a vital role in shiprepairing. Not only do they attract trade and thereby provide an important base workload for a shiprepair facility, they

often own drydocks and provide supporting back-up facilities for the docks such as craneage, water, lighting and compressed air equipment. In Rotterdam, Antwerp and Marseilles, some of the most successful shiprepair ports in Europe, shiprepair is seen as an important integral part of the infrastructure of the port and surrounding area. There is mutual co-operation between the shiprepair companies and port authorities to provide a comprehensive service to shipowners.

6.3.3. FACILITIES AND SKILLS

86. The type and size of ship arriving at a port, or in its vicinity, will determine the type, size and nature of the repair facilities together with the skills of the workforce which are required. The profile of the port trade may change with time and the situation should be continuously monitored by shiprepairers to ensure that facilities and manpower skills are in line with customers requirements.

6.3.4. MARKETING

87. Shipping companies have considerable freedom of choice as to the port, country and sometimes region in which maintenance and repair of their ships is to be effected. There is a requirement for a well-defined international sales organisation with a network of agents in major ports and good promotional literature. Shiprepair has to be "sold".

7. RESEARCH

7.1. GENERAL

88. Most major shipbuilding countries now recognise the need for some organised research effort related to the industry. Ship research associations or institutes exist in Belgium, Bulgaria, Denmark, East and West Germany, Italy, Netherlands, Norway, Poland, Sweden, the United Kingdom, the USSR and Yugoslavia. In Japan, the major shipbuilders have large research organisations which are an integral part of their shipyards. Research organisations are concerned with ship design, with production methods and with the technical aspects of ship operation - seakeeping, wave-induced loads, hull roughness and fouling for example. In recent years considerable exphasis has been placed on research into the use of computers for ship design, production and operation.

89. Major areas for computer applications are:-

(a) Design calculations - hydrostatics, stability, longitudinal strength, resistance and propulsion estimates;

(b) Production - lines fairing (fairing initially defined ships' lines or generating fair lines), parts programming (geometrical definition of the parts of the ship members which are to be cut by numerically controlled machines), shell plate development, nesting of plates (arranging plates in such a way that they may be cut from rectangular plates with the minimum amount of scrap), production planning (critical path analysis), structural design and analysis;

(c) Seakeeping - prediction of ship motions and of the forces acting on the ship in a seaway;

(d) Ship operations - on-line processing computers being used on board for monitoring and control of machinery, cargo handling, anti-collision and navigation;

(e) Information retrieval - data storage and retrieval for providing management with up-to-date information;

(f) Commercial work-routine tasks concerned with wages, finance and costing;

90. Other important areas of research are those concerned with shipboard noise and vibration. Vibration causes damage to the ship's structure and to delicate equipment on board and also makes life uncomfortable for the seafarers. Similarly, excessive noise can have a detrimental effect on the health and hence the efficiency, of those on board. Research effort is now being directed towards identifying major sources of noise and to providing methods of noise reduction/elimination. The United Kingdom Department of Trade, for example, has now published a "Code of Practice for Noise Levels in Ships" the primary aims of which are to "limit maximum noise levels and to reduce exposure to noise in order to:

(a) protect the seafarer from excessive noise levels which may give rise to a noise-induced hearing loss;

(b) provide the seafarer with an acceptable degree of comfort in rest spaces, recreation spaces and other spaces aboard ship, and also provide conditions for recuperation from the effects of exposure to high noise levels;

(c) provide for safe working conditions.

91. "The recommendations provide a basis on which those concerned with designing, building, owning or managing ships can work in order to protect the seafarer from the harmful effects of noise."*

92. Research organisations, shipbuilders and designers rely extensively on model tests. There are 13 model basins throughout the world. While many are engaged on research work on hydrodynamics the majority also offer commercial testing facilities as well as technical and advisory services.

7.2. RESEARCH AND DESIGN REQUIREMENTS IN DEVELOPING COUNTRIES

93. It will be necessary for the participants from each of the countries concerned to provide information on the levels of research and design capability which exist in their countries. Individual countries will then have to decide what resources can be made available for research and development in the future, in co-operation or singly. It is difficult to generalise with regard to the requirements of each of the countries concerned. We have merely itemised some areas of research which are now receiving

*Department of Trade - Merchant Shipping Notice Number M859 - November 1978. CODE OF PRACTICE FOR NOISE LEVELS IN SHIPS.

attention throughout the world. Much of this work is being carried out in countries which are producing high cost, high technology ships where the benefits of research are most apparent. The creation of sophisticated research facilities in developing countries could lead to unnecessary duplication and expense at least during the early years. It was stated in Section 5.2. that joint ventures with developed countries are worthy of consideration as a possible means of obtaining competitive ship designs. The concept of joint ventures might be further extended as a means of providing research and training facilities, instructional staff and skilled manpower until self-sufficiency is achieved. The technology and expertise for designing, model-testing and building ships and for training staff at all levels is already available in the developed countries and in some developing countries.

94. The final decision with regard to the research and design capability required to support maritime industries after development will rest with the individual countries concerned. We have put forward some ideas as a basis for discussion at the Workshop. We would expect participants to develop this theme further on the basis of the resources and aspirations of their own countries.

8. REGIONAL AND INTERNATIONAL ACTION

95. It is for the Workshop to determine the scope for the evolution of regional and international action in specific shipping industry fields. Salient considerations to which participants will need to give weight include:-

(i) There is tonnage over-capacity in virtually every sector of shipping. Many developed countries are now cutting back their shipbuilding capacity. This will aggravate inevitable policy differences between countries and militate against an international or sub-regional approach to the further promotion of shipbuilding.

(ii) Many of the successful shipbuilding nations, like Japan and Brazil, have relied on a strong, and often tied, domestic market to provide a base work load during depressed market conditions and to provide a springboard from which to attack international markets. Ship-owning historically has been a pre-condition for the development of other maritime industries.

(iii) Protectionism in one form or another is commonplace in shipbuilding, shiprepairing and ship operation. It is unlikely that an "infant" maritime industry could survive in today's economic climate without some form of protection.

(iv) UNCTAD policy is to promote the participation and competitiveness of developing countries in the carriage of their own seaborne cargoes. Theoretically this could enable developing

countries to expand their maritime industries under the protection of flag preference and cargo-sharing agreements. In practice international agreement has to be achieved. Sufficient resources then have to be made available for provision of new facilities and ships to provide the capacity required to implement the agreement.

(v) The requirement for skilled personnel for both operational and training purposes will probably necessitate the employment of some expatriate staff in the early stages. There are various methods whereby the requisite skills may be obtained. These include direct recruitment of expatriates; technical assistance from the developed world; and partnership arrangements with shipbuilders in developed countries.

(vi) Ship design and constructional expertise is available, at a price, in the developed countries. In the prevailing economic climate, a government or a shipbuilder in a developed country will have reservations about entering into an arrangement with a developed country and will not seriously prejudice its own maritime industries.

(vii) Shiprepair has a number of characteristics which could make it a viable proposition in an area where shipbuilding would not be viable. Shiprepair does, however, depend on the volume of trade to the region. In this context port services must be considered as an integrated whole. The provision of modern docks, quays, cargo handling facilities and drydocks is a necessary basis for the development of trade. Obviously, however, the

ports along a given length of coastline can only support a limited shiprepair capacity. Regional co-operation may well be required to rationalise capacity and to avoid excessive competition.

96. Commercial considerations point in many instances to some form of international or sub-regional solution, given the political will. Open discussion of the problems at the Workshop may lead to the adoption of government policies which maximise the effectiveness of national resources of labour, technology and finance.

TABLE 8

1975 SHIPBUILDING COMPLETIONS

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA				7.5				7.5
AUSTRALIA	13.1			34.7		0.4	6.9	55.1
BELGIUM	65.1		58.2		33.7	2.0	25.3	184.3
BRAZIL	11.8	65.9	5.6	138.3			1.2	222.8
BULGARIA			34.9					34.9
CANADA	63.1		5.6	47.4		7.9	28.7	152.7
DENMARK	239.9		87.4	149.4		3.8	46.4	526.9
EGYPT				8.8				8.8
FIJI								
FINLAND	55.7			90.2	129.5		65.7	341.1
FRANCE	177.1			98.5	815.8	12.4	69.5	1173.3
GERMANY (EAST)			10.1	224.0		199.5	16.6	450.2
GERMANY (WEST)	507.2		149.7	434.8	57.3	8.4	135.6	1293.0
GREECE	45.3		43.7	21.2		2.6	18.9	131.7
HONG KONG				15.9			2.6	18.5
ICELAND						0.9		0.9
INDIA				45.0			15.0	60.0
INDONESIA				15.6			2.5	18.1
IRISH REPUBLIC				3.2				3.2
ISRAEL								
ITALY	78.1	80.4	24.7	45.0	39.6	9.8	30.8	308.4
JAPAN	5055.7	230.6	1278.6	1865.2	100.1	92.3	332.6	8955.1
KOREA (SOUTH)	256.2		11.3	33.6		8.0		309.1
MALAYSIA							0.3	0.3
MALTA							0.4	0.4
MEXICO						1.5		1.5
NETHERLANDS	176.4		11.3	121.0	68.2	10.2	114.5	501.6
NORWAY	321.2		48.6	122.6	328.7	28.6	32.2	881.9
PAKISTAN								
PERU			10.2			2.2		12.4
PHILIPPINES				2.6			0.6	3.2
POLAND		98.8	103.3	200.8		191.3	9.0	603.2
PORTUGAL				8.8		4.7	1.3	14.8
RUMANIA			31.5	84.0				115.5
SINGAPORE				78.9			35.4	114.3
SOUTH AFRICA						1.3	2.4	3.7
SPAIN	247.3	65.9	179.4	251.6	23.4	113.7	46.0	927.3
SWEDEN	802.4	131.8		10.6	46.9	1.4	8.6	1001.7
TAIWAN	43.0		20.4				0.2	63.6
TURKEY	1.6			20.8			5.9	28.3
UNITED KINGDOM	222.2	32.9	94.2	250.4	14.7	11.5	36.7	662.6
USA	260.2			61.6		26.6	50.3	398.7
USSR				NOT AVAILABLE				
YUGOSLAVIA	76.1	112.9	14.6				17.6	221.2
TOTAL	8718.7	819.2	2223.3	4492.0	1657.9	741.0	1159.7	19811.8

Source: Lloyds Register Shipbuilding Returns

TABLE 9

1975 SHIPBUILDING COMPLETIONS

NUMBER OF SHIPS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA				1				1
AUSTRALIA	3			2		2	17	24
BELGIUM	1		3		3	2	7	16
BRAZIL	2	2	1	17			3	25
BULGARIA	2		3					5
CANADA	4		1	5		9	17	36
DENMARK	4		6	24		14	10	58
EGYPT				1				1
FIJI								
FINLAND	6			10	5		10	31
FRANCE	6			10	9	21	13	59
GERMANY (EAST)			1	23		32	7	63
GERMANY (WEST)	17		12	66	7	15	47	164
GREECE	3		3	3		9	11	29
HONG KONG				3			4	7
ICELAND							3	3
INDIA				3			4	7
INDONESIA	2			1			9	12
IRISH REPUBLIC			1	1				2
ISRAEL								
ITALY	10	3	2	2	1	16	7	41
JAPAN	229	5	121	244	18	125	188	930
KOREA (SOUTH)	6		2	8		15		31
MALAYSIA							1	1
MALTA							2	2
MEXICO						8		8
NETHERLANDS	11		2	34	8	26	62	143
NORWAY	16		2	25	8	48	39	138
PAKISTAN								
PERU			1			3		4
PHILIPPINES							1	1
POLAND	2	3	8	25	2	58	1	99
PORTUGAL	2			1		5	2	10
RUMANIA			5	16				21
SINGAPORE	2			7			46	55
SOUTH AFRICA						8	2	10
SPAIN	9	2	14	27		137	21	210
SWEDEN	30	4		1	1	4	7	47
TAIWAN	1		2				1	4
TURKEY	2			8			3	13
UNITED KINGDOM	10	1	10	22	2	37	32	114
USA	11		1	3		20	92	127
USSR				NOT AVAILABLE				
YUGOSLAVIA	8	3	1				13	25
TOTAL	399	23	202	593	64	614	682	2577

Source: Lloyds Register Shipbuilding Returns

TABLE 10

SHIPBUILDING COMPLETIONS 1ST JULY 1977 - 30TH JUNE 1978

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA			19.2	28.3			1.9	49.4
AUSTRALIA			39.8	4.2		0.4	1.9	46.3
BELGIUM			46.9				13.9	60.8
BRAZIL	26.0	87.0	67.1	69.7		4.9	2.8	257.5
BULGARIA	24.0		59.9					83.9
CANADA	56.7		37.9			1.8	27.5	123.9
DENMARK	142.4		26.2	229.1	2.7	1.2	42.2	443.8
EGYPT				12.2			1.6	13.8
FIJI							0.9	0.9
FINLAND	122.4			66.0			81.8	270.2
FRANCE				596.8	961.7	4.5	14.8	1577.8
GERMANY (EAST)			67.4	324.7		129.7	10.0	531.8
GERMANY (WEST)	8.7	27.5	32.0	1181.3	335.7	1.9	128.5	1715.6
GREECE	1.6		29.1	9.2			17.1	57.0
HONG KONG				4.8			3.1	7.9
ICELAND						1.8	13.8	15.6
INDIA	0.7			31.2		0.2	0.4	32.5
INDONESIA	0.4						1.5	1.9
IRISH REPUBLIC								
ISRAEL								
ITALY	77.6	63.0	59.1	126.9	75.8	6.4	31.5	440.3
JAPAN	950.0	66.5	2220.9	3550.5	158.7	44.8	802.4	7793.8
KOREA (SOUTH)	9.7		59.5	400.8	89.0	3.9	11.5	574.4
MALAYSIA							1.4	1.4
MALTA	2.5							2.5
MEXICO						0.4		0.4
NETHERLANDS	40.5			281.6		1.8	148.5	472.4
NORWAY	39.6			320.5	345.0	27.3	78.6	811.0
PAKISTAN				9.1			0.4	9.5
PERU	10.0					5.1	0.8	15.9
PHILIPPINES	0.6			2.1			5.1	7.8
POLAND	2.1	53.6	36.2	394.5	244.8	26.0	25.8	783.0
PORTUGAL					35.2	0.3	3.5	39.0
RUMANIA			21.7	81.2				102.9
SINGAPORE	31.8			34.9			36.4	103.1
SOUTH AFRICA				31.2			0.8	32.0
SPAIN	336.5	18.5	14.7	260.0	7.7	66.2	47.0	750.6
SWEDEN	708.5	26.8	124.6	69.4		1.0	3.1	933.4
TAIWAN	69.5		9.9	48.3			1.2	128.9
TURKEY	0.3			32.8			27.9	61.0
UNITED KINGDOM	221.4		134.3	428.2	3.5	2.6	77.9	867.9
USA	312.4		36.0	38.0	495.0	7.7	23.9	913.0
USSR				NOT AVAILABLE				
YUGOSLAVIA	42.3	20.4	47.0	49.4			8.0	167.1
TOTAL	3238.2	363.3	3189.4	8716.9	2754.8	339.9	1699.4	20301.9

Source: Lloyds Register Shipbuilding Returns

TABLE 11

SHIPBUILDING COMPLETIONS 1ST JULY 1977 - 30TH JULY 1978

NUMBER OF SHIPS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA			2	3			4	9
AUSTRALIA			2	1		2	3	8
BELGIUM			4				5	9
BRAZIL	1	3	7	10		14	10	45
BULGARIA	1		6					7
CANADA	6		3			7	7	23
DENMARK	6		2	28	1	4	22	63
EGYPT				1			4	5
FIJI				1			2	3
FINLAND	8			13			15	36
FRANCE				23	10	6	12	51
GERMANY (EAST)		1	7	25		22	5	60
GERMANY (WEST)	1		3	97	5	3	70	179
GREECE	2		3	3			15	23
HONG KONG				1			2	3
ICELAND						3		3
INDIA	1			10		1	11	23
INDONESIA	1						1	2
IRISH REPUBLIC							1	1
ISRAEL				1				1
ITALY	6	2	3	5	4	6	12	38
JAPAN	103	3	215	372	35	119	253	1100
KOREA (SOUTH)			6	30	2	13	5	56
MALAYSIA							4	4
MALTA	1							1
MEXICO						1		1
NETHERLANDS	2			53		6	82	143
NORWAY	3			57	11	38	68	177
PAKISTAN				1			1	2
PERU	1					17	2	20
PHILIPPINES	2			4			9	15
POLAND	4	2	5	27	5	22	10	75
PORTUGAL					1	1	10	12
RUMANIA			2	14				16
SINGAPORE	4			9			42	55
SOUTH AFRICA				2			1	3
SPAIN	11	1	2	45	1	65	32	157
SWEDEN	16	1	6	8		2	7	40
TAIWAN	1		1	3			1	6
TURKEY	1			16			18	35
UNITED KINGDOM	8		9	39	1	13	39	109
USA	13		2	1	3	10	65	94
USSR				NOT AVAILABLE				
YUGOSLAVIA	4	1	4	4			4	17
TOTAL	207	14	294	907	79	375	854	2730

Source: Lloyds Register Shipbuilding Returns

TABLE 12

ESTIMATED ANNUAL TOTAL WORLD SHIPBUILDING CAPACITY
FOR VESSELS IN THE SIZE (DEADWEIGHT) CATEGORIES SHOWN

WHERE BUILT	150,000 and above	20,000 to 150,000	10,000 to 20,000	1,000 to 10,000	less than 500	TOTAL
ARGENTINA		1				1
AUSTRALIA		3		3	18	24
BELGIUM		7		6	3	16
BRAZIL	1	6	5	11	2	25
BULGARIA		3		2		5
CANADA		9		14	13	36
DENMARK	4	9	3	16	26	58
EGYPT			1		4	5
FIJI						
FINLAND		14	3	9	5	31
FRANCE	6	13		20	20	59
GERMANY (EAST)		11	8	44		63
GERMANY (WEST)	10	23	18	69	44	164
GREECE		5		11	13	29
HONG KONG				3	4	7
ICELAND					3	3
INDIA		3		3	1	7
INDONESIA				2	10	12
IRISH REPUBLIC		1		1		2
ISRAEL						
ITALY	4	8	2	11	16	41
JAPAN	73	217	75	257	308	930
KOREA (SOUTH)	3	5		6	17	31
MALAYSIA					1	1
MALTA		4			2	6
MEXICO					8	8
NETHERLANDS	5	6	2	76	54	143
NORWAY	4	13	6	40	75	138
PAKISTAN						
PERU		1		2	1	4
PHILIPPINES					1	1
POLAND		26	12	30	31	99
PORTUGAL	1	1	1	1	6	10
RUMANIA		5	3	13		21
SINGAPORE			2	13	40	55
SOUTH AFRICA				1	9	10
SPAIN	6	25	4	57	118	210
SWEDEN	5	26	2	4	10	47
TAIWAN			3		1	4
TURKEY				7	6	13
UNITED KINGDOM	5	19	10	23	57	114
USA	1	14		25	87	127
ALBANIA				1		1
YUGOSLAVIA	2	10		3	10	25
TOTAL	130	488	160	784	1024	2586

Source: Lloyds Register Shipbuilding Returns

TABLE 13

SHIPBUILDING COMPLETIONS - 3RD QUARTER 1977

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA			9.6				0.5	10.1
AUSTRALIA			18.0					18.0
BELGIUM							2.6	2.6
BRAZIL	26.0	29.0	10.5	20.5		1.2		87.2
BULGARIA			20.2					20.2
CANADA	20.0						1.7	21.7
DENMARK	75.6			46.0		0.3	8.5	130.4
EGYPT								
FIJI							0.4	0.4
FINLAND	80.4			19.1			15.9	115.4
FRANCE				79.8	343.7		4.8	428.3
GERMANY (EAST)			14.0	96.0		35.4	2.0	147.4
GERMANY (WEST)		27.5		124.0	28.5	0.2	15.1	195.3
GREECE	0.8		9.7	5.8			11.2	27.5
HONG KONG								
ICELAND								
INDIA				4.9			3.8	8.7
INDONESIA								
IRISH REPUBLIC								
ISRAEL								
ITALY	44.3		39.4	57.3	13.2	0.2	10.0	164.4
JAPAN	268.0		599.1	1025.5	109.9	11.8	70.2	2084.5
KOREA (SOUTH)	9.7		18.4	26.3		1.6	2.6	58.6
MALAYSIA							0.3	0.3
MALTA								
MEXICO								
NETHERLANDS				45.7		0.8	31.4	77.9
NORWAY	20.7			77.6	225.4	5.3	19.8	348.8
PAKISTAN								
PERU						2.2		2.2
PHILIPPINES				1.5			1.3	2.8
POLAND	1.1		12.2	66.5	137.9	4.2	3.1	225.0
PORTUGAL					35.2		0.3	35.5
RUMANIA								
SINGAPORE							12.1	12.1
SOUTH AFRICA								
SPAIN	41.6			62.0		22.9	9.3	135.8
SWEDEN	196.0		25.9	5.1		0.2	0.5	227.7
TAIWAN							1.2	1.2
TURKEY				12.1			8.4	20.5
UNITED KINGDOM	65.3		53.9	104.2	3.5	0.7	16.2	243.8
USA	68.5					2.3	8.3	79.1
USSR				NOT AVAILABLE				
YUGOSLAVIA	21.9		23.5					45.5
TOTAL	939.9	56.5	854.4	1879.9	897.3	89.3	261.5	4978.8

Source: Lloyds Register Shipbuilding Returns

TABLE 14

SHIPBUILDING COMPLETIONS - 4TH QUARTER 1977

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA			9.6	28.3				37.9
AUSTRALIA			21.8				1.1	22.9
BELGIUM							0.2	0.2
BRAZIL		29.0	19.7	16.2		1.2	0.6	66.7
BULGARIA	24.0		10.1					34.1
CANADA	17.1		26.2				3.1	46.4
DENMARK	17.7		12.8	70.5	2.7		5.8	109.5
EGYPT				6.3			0.4	6.7
FIJI								
FINLAND	7.9			12.0			23.6	43.5
FRANCE				157.1	444.7	1.4	1.7	604.9
GERMANY (EAST)			17.8	80.4		29.5		127.7
GERMANY (WEST)	8.7		13.7	389.9	210.5		42.9	665.7
GREECE	0.8		9.7				0.6	11.1
HONG KONG								
ICELAND						0.5		0.5
INDIA							2.4	2.4
INDONESIA	0.4							0.4
IRISH REPUBLIC								
ISRAEL								
ITALY	14.8	63.0				2.4	1.7	81.9
JAPAN	536.0	66.5	447.3	825.3	31.4	8.5	190.1	2105.1
KOREA (SOUTH)			20.2	105.5		2.3	2.9	130.9
MALAYSIA								
MALTA								
MEXICO								
NETHERLANDS	0.2			131.6		0.8	29.2	161.8
NORWAY	9.6			91.6	43.1	2.1	23.1	169.5
PAKISTAN							0.4	0.4
PERU						2.9	0.4	3.3
PHILIPPINES	0.4						0.7	1.1
POLAND	0.5	26.8	17.9	75.7		8.4	3.1	131.9
PORTUGAL							2.3	2.3
RUMANIA								
SINGAPORE	31.2			13.1			5.5	49.8
SOUTH AFRICA				15.6			0.8	16.4
SPAIN	189.2		7.3	58.9		18.1	15.7	289.2
SWEDEN	355.5		51.9	8.9		0.8		417.1
TAIWAN	69.5			9.5				79.0
TURKEY	0.3			9.2			6.5	16.0
UNITED KINGDOM	15.0		27.2	113.2		0.2	14.2	169.8
USA	93.3		18.0		182.8	2.5	7.8	304.4
USSR				NOT AVAILABLE				
YUGOSLAVIA			12.0	16.1			7.4	35.5
TOTAL	1392.1	185.3	743.2	2234.9	915.2	81.6	394.2	5946.5

Source: Lloyds Register Shipbuildin[illegible]

TABLE 15

SHIPBUILDING COMPLETIONS - 1ST QUARTER 1978

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA							1.4	1.4
AUSTRALIA				4.2				4.2
BELGIUM			18.0				9.0	27.0
BRAZIL			15.4	19.2		2.2	1.6	38.4
BULGARIA			10.1					10.1
CANADA	9.8					0.6	12.0	22.4
DENMARK	31.4			72.3		0.3	2.9	106.9
EGYPT				5.9			0.7	6.6
FIJI							0.2	0.2
FINLAND	26.2			22.5			20.4	69.1
FRANCE				115.9	137.2	1.3	1.6	256.0
GERMANY (EAST)			17.8	94.5		35.4	4.0	151.7
GERMANY (WEST)			18.3	334.7	96.7		15.0	464.7
GREECE			9.7	3.4			3.5	16.6
HONG KONG				4.8			3.1	7.9
ICELAND						0.7		0.7
INDIA	0.7			26.3			5.2	32.2
INDONESIA							0.4	0.4
IRISH REPUBLIC							1.5	1.5
ISRAEL								
ITALY	4.6			69.6	15.6		1.8	91.6
JAPAN	84.6		751.0	771.2	3.3	8.6	272.3	1891.0
KOREA (SOUTH)			11.0	144.0	46.1		6.0	207.1
MALAYSIA							0.3	0.3
MALTA	2.5							2.5
MEXICO						0.4		0.4
NETHERLANDS	40.3			49.9		0.2	43.3	133.7
NORWAY	9.3			81.1	12.6	10.8	14.9	128.7
PAKISTAN				9.1				9.1
PERU	10.0						0.4	10.4
PHILIPPINES	0.2						0.5	0.7
POLAND		26.8	6.1	120.7		12.5	5.5	171.6
PORTUGAL						0.3	0.7	1.0
RUMANIA				6.3				6.3
SINGAPORE	0.6			12.0			15.2	27.8
SOUTH AFRICA				15.6				15.6
SPAIN	73.2			87.2		17.3	11.8	189.5
SWEDEN		26.8	33.5	37.5			0.7	98.5
TAIWAN			9.9	9.5				19.4
TURKEY				6.9			8.6	15.5
UNITED KINGDOM	99.1		10.8	83.2		0.9	9.7	203.7
USA	94.4					1.1	5.9	101.4
USSR				NOT AVAILABLE				
YUGOSLAVIA		20.4	11.5					31.9
TOTAL	486.9	74.0	923.1	2207.5	311.5	92.6	480.1	4575.7

Source: Lloyds Register Shipbuilding Returns

TABLE 16

SHIPBUILDING COMPLETIONS - 2ND QUARTER 1978

THOUSAND COMPENSATED GROSS TONS

WHERE BUILT	OIL TANKERS	COMBINED CARRIERS	ORE AND BULK CARRIERS	GENERAL CARGO	GAS AND CHEMICAL TANKERS	FISHING VESSELS	MISC	TOTAL
ARGENTINA								
AUSTRALIA						0.4	0.8	1.2
BELGIUM			28.9				2.1	31.0
BRAZIL		29.0	21.5	13.8		0.4	0.6	65.3
BULGARIA			19.5					19.5
CANADA	9.8		11.7			1.2	10.7	33.4
DENMARK	17.7		13.4	40.3		0.6	25.0	97.0
EGYPT							0.5	0.5
FIJI							0.3	0.3
FINLAND	7.9			12.4			21.9	42.2
FRANCE				244.0	36.1	1.9	6.7	288.7
GERMANY (EAST)			17.8	53.8		29.5	4.0	105.1
GERMANY (WEST)				332.7		1.7	55.5	389.9
GREECE							1.8	1.8
HONG KONG								
ICELAND						0.6		0.6
INDIA						0.2	2.4	2.6
INDONESIA								
IRISH REPUBLIC								
ISRAEL								
ITALY	13.9		19.7		47.0	3.5	18.0	102.1
JAPAN	61.4		423.5	928.5	14.1	15.9	269.8	1713.2
KOREA (SOUTH)			9.9	125.0	42.9			177.8
MALAYSIA							0.8	0.8
MALTA								
MEXICO								
NETHERLANDS				54.4			44.6	99.0
NORWAY				70.2	63.9	9.2	20.8	164.1
PAKISTAN								
PERU								
PHILIPPINES				0.6			2.6	3.2
POLAND	0.5			131.6	106.9	0.9	14.1	254.0
PORTUGAL							0.2	0.2
RUMANIA			21.7	74.9				96.6
SINGAPORE				9.8			3.6	13.4
SOUTH AFRICA								
SPAIN	32.5	18.5	7.4	51.9	7.7	7.9	10.2	136.1
SWEDEN	157.0		13.3	17.9			1.9	190.1
TAIWAN				29.3				29.3
TURKEY				4.6			4.4	9.0
UNITED KINGDOM	42.0		42.4	127.6		0.8	37.8	250.6
USA	56.2		18.0	38.0	312.2	1.7	1.9	428.0
USSR				NOT AVAILABLE				
YUGOSLAVIA	20.4			33.3			0.6	54.3
TOTAL	419.3	47.5	668.7	2394.6	630.8	76.4	563.6	4800.9

Source: Lloyds Register Shipbuilding Returns

TABLE 17

MERCHANT FLEETS* OF DEVELOPING COUNTRIES IN THE MEDITERRANEAN (1ST JULY 1977) - GROSS TONNAGE

Flag / Ship Type	ALBANIA	ALGERIA	CYPRUS	EGYPT	GREECE	LEBANON	LIBYA	MALTA	MOROCCO	SYRIA	TUNISIA	TURKEY	YUGOSLAVIA	TOTAL m.grt
Oil Tanker		623203	301699	126887	9725491		595381	23267	105582		26827	366610	233774	12.129
LNG Carrier		192800	5091		15700				2345			3634		0.220
Chemical Tanker			11504				3148		30023	323	3280	9080		0.057
Misc. Tanker		3111	1988		9706				1100			3231		0.019
Bulk/Oil & Ore/Oil			17948		1515861								45330	1.579
Ore & Bulk Carriers		63094	193032		9063755			20574	32494		20157	333055	770758	10.497
General Cargo	54631	123034	2129725	181804	8343803	201396	36332	48997	75456	19043	46552	375487	1128270	12.765
Passenger/Cargo			45386	45244	179635	20593						93284	38369	0.423
Fully Cellular Container			5081		20738								20226	0.046
Fish Factories & Carriers					3167				1966			633	113	0.006
Fishing (including factory trawlers)	300	2371	3182	8728	43623	560	1106		6365		148	501	2518	0.069
Ferries & Passenger Ships		42275	60722	12465	554723		30468	3350	9110		286	83307	27718	0.824
Supply Ships & Tenders			172	5857			2500							0.009
Tugs		4574	1281	14329	19704		1920	3137	2557	933	2878	7637	7091	0.066
Dredgers	939			7689	1990		644	499	2183			1651	5173	0.020
Livestock Carriers			4570		1502	4245								0.010
Research Ships				819	1707							750	331	0.003
Ice Breakers													159	0.00016
Miscellaneous (non-trading)		1500	6521	3996	15954	215	2470	616	1114	380		9397	4696	0.047
Total (million g.r.t.)	0.056	1.056	2.788	0.408	29.517	0.227	0.674	0.100	0.270	0.021	0.100	1.288	2.285	38.789
% OF WORLD TOTAL	0.01	0.27	0.71	0.10	7.50	0.06	0.17	0.03	0.07	0.01	0.03	0.33	0.58	9.87

* excluding vessels of less than 100 tons gross Source: Lloyd's Register of Shipping Statistical Tables 1977

TABLE 18

MERCHANT FLEETS* OF DEVELOPING COUNTRIES IN THE MEDITERRANEAN (1ST JULY 1977) - NUMBERS OF SHIPS

Flag / Ship Type	ALBANIA	ALGERIA	CYPRUS	EGYPT	GREECE	LEBANON	LIBYA	MALTA	MOROCCO	SYRIA	TUNISIA	TURKEY	YUGOSLAVIA	TOTAL
Oil Tanker		17	28	24	428		11	3	5		2	54	30	602
LNG Carrier		4	4		10				1			3		22
Chemical Tanker			9				1		5	1	1	4		21
Misc. Tanker		1	2		6				1			3		13
Bulk/Oil & Ore/Oil			1		28								1	30
Ore & Bulk Carriers		5	17		560			2	2		2	16	45	649
General Cargo	17	34	679	58	1795	153	16	17	30	25	18	195	259	3296
Passenger/Cargo			7	7	32	2						17	9	74
Fully Cellular Container			5		3								3	11
Fish Factories & Carriers					2				1			4	1	8
Fishing (including factory trawlers)	2	22	7	6	100	4	8		24		1	2	5	181
Ferries & Passenger Ships		5	23	4	210		3	6	4		1	102	55	413
Supply Ships & Tenders			1	7			1							9
Tugs		23	7	51	71		8	13	13	5	14	31	26	262
Dredgers	1			1	4		1	1	2			2	5	17
Livestock Carriers			5		3	3								11
Research Ships				2	2							1	2	7
Ice Breakers													1	1
Miscellaneous (non-trading)		1	5	16	90	1	4	2	3	1		14	17	154
Total	20	112	800	176	3344	163	53	44	91	32	39	448	459	5781
% OF WORLD TOTAL	0.03	0.16	1.18	0.26	4.92	0.24	0.08	0.06	0.13	0.05	0.06	0.66	0.68	8.51

*excluding ships of less than 100 tons gross

Source: Lloyd's Register of Shipping Statistical Tables 1977

TABLE 19

NUMBER OF SHIPS ON ORDER FROM DOMESTIC SHIPYARDS FOR OWNERS IN THE COUNTRIES SHOWN

Ship Type / Country	Dry Cargo	Container Ships	Tankers 150,000 dwt and above	Tankers	OBO's	Bulk Carriers	Passenger Ships and Ferries	Misc.	Total
ALBANIA	1								1
ALGERIA									
CYPRUS									
EGYPT	9								9
GREECE	6	1				2	3	1	13
LEBANON									
LIBYA									
MALTA	4								4
MOROCCO									
SYRIA									
TUNISIA									
TURKEY	43	4		1		5	2		55
YUGOSLAVIA	4	3				3		2	12
TOTAL	67	8		1		10	5	3	94

TOTAL DEADWEIGHT OF SHIPS ON ORDER FROM DOMESTIC SHIPYARDS FOR OWNERS IN THE COUNTRIES SHOWN

Ship Type / Country	Dry Cargo	Container Ships	Tankers 150,000 dwt and above	Tankers	OBO's	Bulk Carriers	Passenger Ships and Ferries	Misc.	Total
ALBANIA	2750								2750
ALGERIA									
CYPRUS									
EGYPT	65310								65310
GREECE	36910	3000				74000	14110	1400*	128020
LEBANON									
LIBYA									
MALTA	22796								22796
MOROCCO									
SYRIA									
TUNISIA									
TURKEY	231124	16400		750		90000	1766		340040
YUGOSLAVIA	65400					90000		1060+	155400
TOTAL	424290	19400		750		254000	15876		**714316

Source: Fairplay International World Ships on Order 16th November, 1978

*tons gross +full load displacement **excluding passenger ships, ferries and miscellaneous

TABLE 20

NUMBER OF SHIPS ON ORDER FROM OVERSEAS SHIPYARDS FOR OWNERS IN THE COUNTRIES SHOWN

Country \ Ship Type	Dry Cargo	Container Ships	Tankers 150,000 dwt and above	Tankers	OBO's	Bulk Carriers	Passenger ships and Ferries	Misc.	Total
ALBANIA									
ALGERIA	3	7		4					14
CYPRUS									
EGYPT	1						8	1	10
GREECE	50	3				23			76
LEBANON		2					5		7
LIBYA								3	3
MALTA									
MOROCCO	1			2					3
SYRIA									
TUNISIA	2			3					5
TURKEY	1	2		1					4
YUGOSLAVIA	3			1					4
TOTAL	61	14		11		23	13	4	126

TOTAL DEADWEIGHT OF SHIPS ON ORDER FROM OVERSEAS SHIPYARDS FOR OWNERS IN THE COUNTRIES SHOWN

Country \ Ship Type	Dry Cargo	Container Ships	Tankers 150,000 dwt and above	Tankers	OBO's	Bulk Carriers	Passenger ships and Ferries	Misc.	Total
ALBANIA									
ALGERIA	35730	28800		193890					258420
CYPRUS									
EGYPT	6372						16600*	499*	6372**
GREECE	834355	31100				668270			1533725
LEBANON		2400					n.a.		2400
LIBYA								444	444
MALTA									
MOROCCO	3360			43800					47160
SYRIA									
TUNISIA	16800			24500					41300
TURKEY	17000	7000		7000					31000
YUGOSLAVIA	46500			79000					125500
TOTAL	960117	69300		348190		668270		444	2045877**

Source: Fairplay International World Ships on Order 16th November, 1978
* tons gross ** excluding passenger ships, ferries and miscellaneous

TABLE 21 SHIP REPAIR FACILITIES IN EUROPE (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
BELGIUM	3	1	2	7			10			1			24
CYPRUS		1											1
DENMARK	3	6	3	4	2		5	1					24
EIRE		1		3	1		1						6
FAROES			3										3
FINLAND		6	2	2	1		3			1			15
FRANCE	18	6	4	16	2		25	2		7			80
E. GERMANY		5			1								6
W. GERMANY	3	27	23		10		8	10		2			83
GIBRALTAR				1			3						4
GREECE	1	1	3	1	3			6		2			17
ITALY	1	12	4	9	2		17	5		1 + 1*			51 + 1*
MALTA				1			4			1*			5 + 1*
NETHERLANDS	5	14	23	2	9		11	8		2			74
NORWAY	5 + 1*	12	11	4	3		7	1		1			44 + 1*
POLAND		11			1			1					13
PORTUGAL	6	2	1	1			3			5			18
RUMANIA		1		1									2
SPAIN	3	13	25	8			12 + 1*	1		1 + 2*			63 + 3*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational

Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 21 cont. EUROPE continued

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
SWEDEN	11	10	6	2	2		7	3					41
TURKEY		1		2	1								4
UNITED KINGDOM	40	1	7	31			62			2			143
YUGOSLAVIA		4	1		3			1					9
EUROPE TOTAL	99 + 1*	135	118	95	41		178 + 1*	39		25 + 4*			730 + 6*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational

Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 22 SHIP REPAIR FACILITIES IN MIDDLE EAST (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Country \ Type	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
BAHRAIN			4							1			5
EGYPT		1	2		1		3	1					8
IRAN		1 + 1*	1				1*			2*			2 + 4*
IRAQ		1											1
ISRAEL		2						1*					2 + 1*
KUWAIT			1					1					2
LEBANON			1										1
UNITED ARAB EMIRATES		1								3*			1
YEMEN			1										2 + 3*
MIDDLE EAST TOTAL		7 + 1*	10		1		3 + 1*	2 + 1*		1 + 5*			24 + 8*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational

Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 23 REPAIR FACILITIES IN AFRICA (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
ALGERIA	1		1				1						3
ANGOLA		1	4										5
CAMAROON REPUBLIC		1											1
CANARY IS.		1	3					1					5
GHANA	2						1						3
GUINEA			1										1
IVORY COAST		1											1
KENYA							1						1
MALAGASY REPUBLIC							1						1
MAURITIUS				1									1
MOROCCO							1						1
MOZAMBIQUE	2												2
NIGERIA		1											1
SENEGAL		2	1				1	1*					4 + 1*
S. AFRICA		3	1				5			1*			9 + 1*
TUNISIA	1						3						4
ZAIRE		2											2
AFRICA TOTAL	6	12	11	1			14	1 + 1*		1*			45 + 2*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational

Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 24 SHIP REPAIR FACILITIES IN NORTH AND CENTRAL AMERICA (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
BARBADOS		1											1
CANADA	3	2	17	2	1		10	2					36
CUBA			1				1						2
DOMINICAN REPUBLIC	1	1			1								3
GREENLAND		1	1										2
HAITI			1										1
MARTINIQUE							1						1
MEXICO	1	3			1		2						7
PANAMA			1	1			1						3
PUERTO RICO							1						1
VIRGIN ISLANDS&			1										1
U.S.A.	31	74	25	7	25		36	19		6			223
N. & C. AMERICA TOTAL	36	82	47	10	28		51	21		6			281

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational
Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 25 SHIP REPAIR FACILITIES IN SOUTH AMERICA (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
ARGENTINA		6	2	1	1		3						13
BRAZIL	5	3	2	1	1		5	1		1			19
CHILE		3	1	1			1						6
COLOMBIA	1	1											2
ECUADOR			1										1
NETHERLANDS ANTILLES		1					2						3
PERU		2					1						3
TRINIDAD					1								1
URAGUAY	1		1		3								5
VENEZUELA		1	1				1						3
SOUTH AMERICA TOTAL	7	17	8	3	6		13	1		1			56

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational
Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 20 SHIP REPAIR FACILITIES IN AUSTRALASIA (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
AUSTRALIA	5	4	6	1	1		3			1			21
FIJI			2										2
HAWAII		1	1				3			1			6
NEW ZEALAND			2	1	1		1			1			6
AUSTRALASIA TOTAL	5	5	11	2	2		7			3			35

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways

* Not yet operational

Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 27 SHIP REPAIR FACILITIES IN FAR EAST (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
BANGLADESH			1										1
BRUNEI		1											1
HONG KONG				2	1		1	2					6
INDIA	17	2	2	9			8 + 1*						38 + 1*
INDONESIA	2	8	1		1			1					13
JAPAN	53	13	7	28	1		48	4		24			178
S. KOREA	2				1		1			4			8
MALAYSIA	1		1				1			1			4
PAKISTAN				1			1						2
PHILIPPINES	1	1	9				1						12
SINGAPORE	1	4	9	5			5			6			30
SRI LANKA	2						1						3
TAIWAN				1			3			1			5
THAILAND	4	1		2									7
VIETNAM							1						1
FAR EAST TOTAL	83	30	30	48	4		71 + 1*	7		36			309 + 1*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways
* Not yet operational
Source: Motorship Special Survey 1978 Terminal Operators Ltd.

TABLE 28 SHIP REPAIR FACILITIES - WORLD SUMMARY (OVER 1,000 TONS CAPACITY)

CAPACITY‡	1,000 to 9,999			10,000 to 19,999			20,000 to 149,999			150,000 and above			TOTAL
Type / Country	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	DRY DOCK	FLOATING DOCK	SLIPWAY	
AFRICA	6	12	11	1			14	1+1*		1*			45+2*
EUROPE	99+1*	135	118	95	41		178+1*	39		25+4*			730+6*
MIDDLE EAST		7+1*	10		1		3+1*	2+1*		1+5*			24+8*
FAR EAST	83	30	30	48	4		71+1*	7		36			309+1*
AUSTRALASIA	5	5	11	2	2		7			3			35
NORTH & CENTRAL AMERICA	36	82	47	10	28		51	21		6			281
SOUTH AMERICA	7	17	8	3	6		13	1		1			56
WORLD TOTAL	236+1*	288+1*	235	159	82		337+3*	71+2*		72+10*			1480+17*

‡ Capacity:- given as deadweight for dry docks and as lift capacity for floating docks and slipways

* Not yet operational

Source: Motor [illegible] Special Survey 1978 Terminal Operators Ltd.

TABLE 29 SHIP REPAIR FACILITIES IN THE MEDITERRANEAN (OVER 1,000 TONS CAPACITY)

CAPACITY* / COUNTRY	1,000 to 4,999	5,000 to 9,999	10,000 to 14,999	15,000 to 19,999	20,000 to 39,999	40,000 to 59,999	60,000 to 99,999	100,000 to 199,999	200,000 to 499,999	500,000 and above	TOTAL
SPAIN (Med.Coast)	10	4		2	3	1	1		1 + 1*	2*	22 + 3*
GIBRALTAR			1		2		1				4
FRANCE (Med.Coast)		1	7		4	2	1	2		1	18
ITALY	16	1	4	7	8	6	5	3	1 + 1*		51 + 1*
MALTA				1	2	1	1		1*		5 + 1*
YUGOSLAVIA	2	3	3		1						9
GREECE	4	1	3	1	6				1	1	17
TURKEY		1	1	2							4
CYPRUS	1										1
LEBANON	1										1
ISRAEL	1	1			1*						2 + 1*
EGYPT	2	1		1	3		1				8
TUNISIA		1				2	1				4
ALGERIA	1	1			1						3
MOROCCO					1						1
TOTALS	38	15	19	14	31 + 1*	12	11	5	3 + 3*	2 + 2*	150 + 6*

*Capacities are given as deadweight for dry docks and as lift capacity for floating docks and slipways
*Not yet operational

Source: Motorship Special Survey 1978
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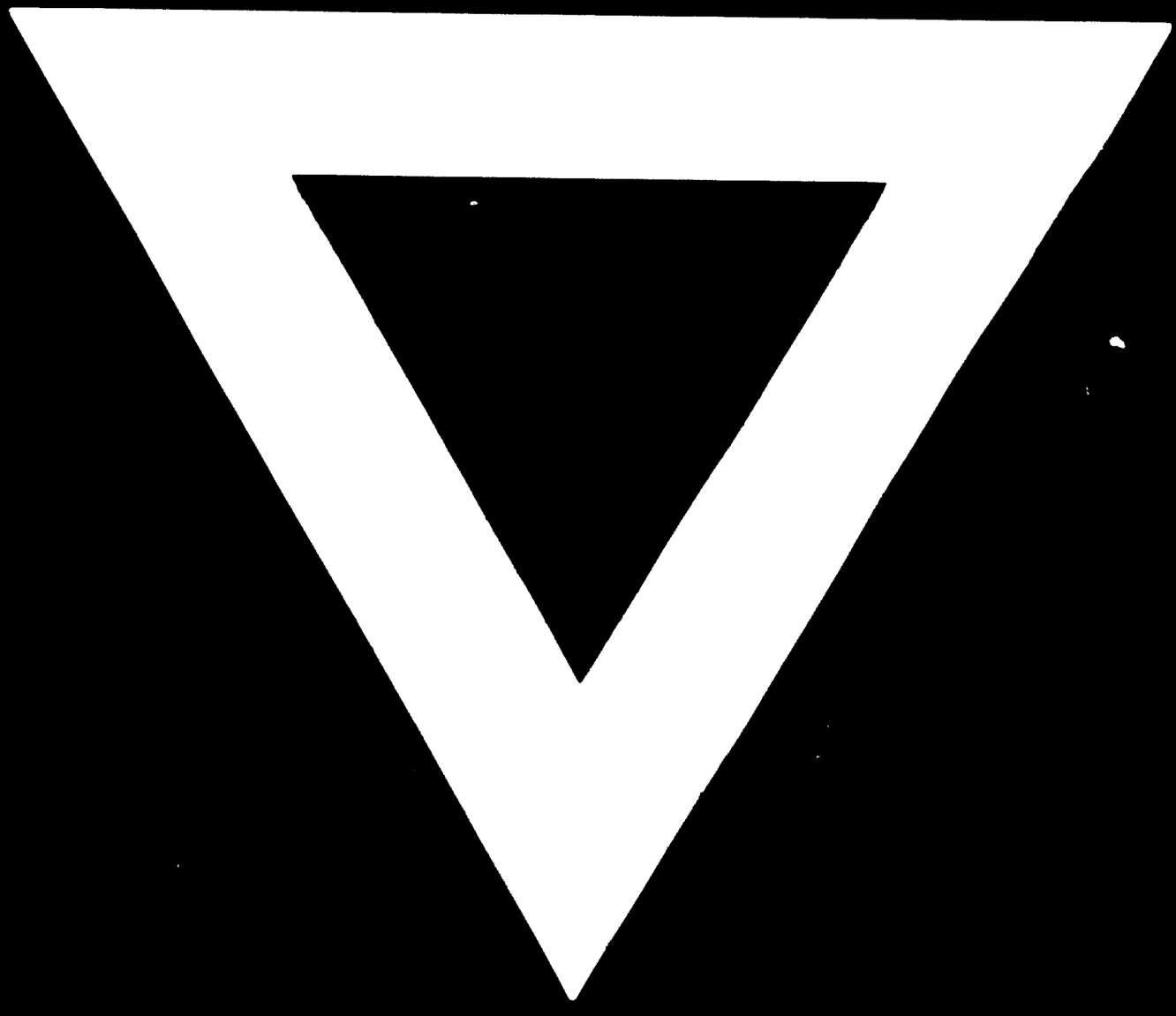

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