# SEA TRANSPORT IN THE SEVENTIES

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## INTRODUCTION

Before talking about sea transport, I would first like to say a few words on the growth of world trade.

The average annual growth in the volume of world trade has been about 7% per annum in the post war period. This is ten times what it was in the 1913-1938 period. Between 1967 and 1968, growth in volume was a record 12% and in the first half of 1969, it was equivalent to an annual growth rate of almost 13%.

There have, of course, been fluctuations from year to year, but the conclusion is inescapable; the volume of world trade has increased enormously and can be expected to continue increasing in the years ahead. It is also significant that the greatest increases have occurred between developed countries; countries where the costs of labour are high and large capital sums are available. Naturally, therefore, they have sought to cope with the increase by developing capital intensive handling and transport systems. This is particularly important in Australia, where labour costs are traditionally high. This last decade has seen a trebling in the volume of Australia's goods shipped overseas, and an increase of 44% in the volume of trade shipped interstate.

In considering the various forms of marine transport, the multiplicity of developments that should be mentioned is almost overwhelming. It is not possible in this paper to cover technical details concerning ship design and operations such as is likely to interest many of you here. I will, however, try to present a broad picture of what is happening today in the field of Marine Transportation by referring to the various vessel types and their application, particularly in regard to the Australian scene at present, and conclude with some reflections regarding developments likely to be experienced in the seventies.

## PASSENGER VESSELS

The world fleet of large passenger vessels is rapidly decreasing. It is sad to record here that many of these fine vessels still sailing today on established trade routes to and from Australia will not be replaced. The introduction and rapid development of the aircraft jet engine coupled with spectacular development in aircraft design particularly in the last decade, has placed air transport in a commanding position against which passenger vessels find it hard or impossible to compete. This position will be further strengthened with the introduction of larger aircraft such as jumbo jets.

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Well known Australian Flag passenger vessels such as "Manunda", "Manoora", "Duntroon", "Westralia", "Kanimbla", etc. have long since been sold off the Coast and not replaced. Plagued by industrial problems and high operating costs, their owners could not afford to keep them running. We have, of course, the roll-on/roll-off type of vessels such as the "Princess of Tasmania", "Empress of Australia" and "Australian Trader" operated by the Australian National Line on a regular ferry service between the mainland and Tasmania, but it is significant to record that the economics of operating such vessels are more dependent on new cargo carrying techniques than the revenue from carriage of passengers.

It is, however, worth noting that many overseas shipowners, after experiencing diminishing returns from the operation of passenger vessels on regular services in recent years, have recorded satisfactory returns from planned cruises designed to cater for an affluent society, seeking relaxation or pleasure bent.

Such cruises are already very popular in the Mediterranean and Caribbean and are likely to become more popular in Australian waters. Confidence in success of cruising has been demonstrated by several shipping companies which ordered vessels specially designed for the purpose.

Linking flying with cruising for different sections of these voyages, shipping and air companies have found a complementary business, which will undoubtedly benefit both.

## BULK CARRIERS AND TANKERS

The growth in the world bulk carrier fleet has been quite phenomenal over the last decade. At the beginning of 1958, the fleet totalled less than 4 million tons deadweight; by the middle of 1969 it had grown to 62 million tons dwt. The size of individual bulk carriers has also increased very rapidly. At the beginning of 1966 vessels over 50,000 tons dwt. accounted for 13% of the total tonnage; by the middle of 1969 their share had increased to over 33%. Latest statistics of vessels on order January 1, 1970, show that 481 bulk carriers, including oil/bulk/ore carriers on order, totalled 28,427,000 dwt. Of these, 96 were over 100,000 dwt., totalling 13,864,000 dwt. This would seem to indicate that almost 50% of all bulk cargoes carried in the future could be accommodated in vessels of 100,000 dwt. and over.

The increase in size of vessel is even more marked in tankers. Fifteen years ago there was not one oil tanker above 40,000 dwt., but by November, 1969, there were 529.

Five years ago there was not one tanker above 80,000 dwt., but again by November, 1969, there were 79 larger vessels.

Statistics covering vessels on order January 1, 1970, show that 269 were tankers of 60,000 dwt. and over. Of these, 198 were 200,000 dwt. and over. This would indicate that most of the worlds crude oils will be carried in tankers of 200,000 dwt. and over.

The largest tanker on order is 477,000 dwt. and it is probable that even larger vessels will be ordered in the future. While there is no technical barrier against building tankers over 500,000 dwt., the present trend is to stabilize around 200 - 300,000 dwt. vessels, with a much smaller number of larger vessels to cover specific routes. One of the reasons given for stabilizing around 2 - 300,000 ton vessels is the possibility of re-opening the Suez Canal and proposals to cater for vessels of this size.

Over recent years the combined ore bulk oil carrier has also increased in number and size. Such vessels are built to cater for trade fluctuations and their potentiality towards minimizing the number of ballast voyages. It is of interest to note that ten of these vessels now on order are between 250 - 300,000 dwt.

The introduction of these large vessels results mainly from economy of scale, the establishment of large scale oil and ore installations and the technical advances which make it possible to build and operate such large vessels with minimum crews.

The following figures recently quoted from a London source will serve to indicate cost advantages to be gained as a direct result of scale effect. The figures apply to tankers plying between the Persian Gulf and U.K., returning in ballast.

| Size of vessel | Break even cost per ton of cargo carried |
|---|---|
| 50,000 dwt. | $4.91 |
| 90,000 " | 3.43 |
| 170,000 " | 2.54 |
| 250,000 " | 2.26 |

Dry bulk carriers have also benefited by scale effect; however, port limitations, turn round time and problems associated with the stockpiling of huge quantities of dry bulk cargoes are more restrictive than with tankers. This is the main reason why the size of dry bulk carrier has not increased to the same extent as with tankers.

Over the last ten years or more economics resulting from scale effect have tended to more than offset increased capital and running costs, and in some areas freight rates have actually been reduced. However, the position today is such that further advantages to be gained by economy of scale can be more than offset by increased costs in other directions, particularly in regard to dry bulk carriers and we can, therefore, expect increased freight rates to apply in the seventies.

## GENERAL CARGO SHIPS

While the tonnage of general cargo carried by sea is less than that of the bulk commodities, it is in this area that most public interest has been centred. As you are well aware, the most important development in recent years has been the international acceptance of unitised cargo handling procedures involving pallets, large flats and totally enclosed containers.

The influence of this development is not so much in the concept, which is not novel - man has been carrying things in boxes for centuries - ~~but~~ rather in the universal adoption and standardisation of unit sizes. The designs of ships, ports, cargo handling equipment, road and rail transport, have all been developed around the unit load in order to give a door to door service to shippers requiring their goods transported to another part of Australia or overseas.

This integration with land transport gave impetus to an intermodal concept and unitisation of general cargoes into international standardised packages.

The growth of containerisation over the last few years has been very rapid, particularly between developed countries, where the transition from labour intensive to mechanised capital intensive transport operations, is paving the way for increased efficiency in the transportation field.

In the general cargo trade of today it can be said in so far as unit carriers are concerned, that apart from dry bulk carriers previously described, there are three recognisable basic types, i.e. cellular container ship, vehicle deck ship and conventional general cargo ship.

From the point of view of marine transportation, I would consider that 1955 was the most significant year in container ship development. In that year, Mr. Malcolm Maclean, an American road haulier sold his stock in the Maclean Trucking Company and acquired the Waterman Steamship Corporation, together with its wholly owned subsidiary, Pan-Atlantic Steamship Corporation. He had in mind a new concept of co-ordinated road-sea transportation, under the control of one company. Two years later s.s. "Gateway City" of Pan-Atlantic Steamship Corporation made her inaugeral voyage between Newark and Housten as the first vessel in the world to be converted into a full container ship. She was quickly followed by six Jumboized C2 liberty vessels similarly converted for service between Newark and Puerto-Rico. As most of you know, from this small beginning emerged the giant Sea-Land Service, by far the most powerful and aggressive container service operation in the world today.

In regard to this development, two things stand clearly in my mind; the first is, that the conversion of "Gateway City" called for an extremely radical approach to ship design and construction, particularly in regard to cargo stowage, security and loading and discharge procedures. It is indeed, a wonderful tribute to those responsible to record that the most modern container ship today incorporates all principle features demonstrated for the first time by "Gateway City." The second point, is that Pan-Atlantic introduced the 35'0" box, and despite subsequent international standardisation, Sea-Land continue to promote the 35'0" module. There cannot be any doubt that standardisation around the 35'0" container is directed towards economics covering the road transport sector.

Vehicle deck cargo vessels were firmly established during the Second World War in the form of landing craft specially designed to carry heavy equipment in seaborne operations.

The credit for developing this idea after the war for commercial purposes, should, in my opinion, go to Lt. Col. Frank Bustard who pioneered the formation of Atlantic Steam Navigation Company in 1946, and from which grew Britain's Transport Ferry Service. At the time, the newly formed Atlantic Steam Navigation Company acquired three Landing Ship Transport (L.S.T.) from the Admiralty and after conversion to meet merchant navy requirements, entered service in September, 1946, between Tilbury and Hamburg, ferrying many thousands of vehicles for the army of occupation in Germany. By 1955, the fleet strength was then brought up to seven, operating through the port of Antwerp. A similar service was later established between Northern Ireland and England, using end-loading facilities already established at the port of Larne, and a pontoon and bridge facility provided in Preston.

It is interesting to note that a typical cargo load for one of these vessels could involve 14 shippers with say 68 vehicles made up as follows; 9 private traders with one vehicle each; 3 road hauliers with a total of 41 trailers; 1 container operator with 10 containers and 1 exporter with 8 new cars. In fixing freight rates, therefore, the total dwt. or measurement tonnage carried was of little consequence, and seldom, if ever, would the total dwt. of a full cargo equal the cargo deadweight capacity of the ship. The only factor of importance was the ability to cover all deck space with vehicles. In this service one talked of "door to door service without the wheels leaving the road" - a virtual sea bridge.

In 1957, Atlantic Steam Navigation Company commissioned the 1210 ton dwt. vessel "Bardic Ferry". This vessel which was one of the first commercial vehicle deck ships to be specially designed and built for the carriage of vehicles, trailers and containers, operated between Larne and Preston, and was the forerunner of the vehicle deck concept as we know it today. However, some of the more modern vehicle deck vessels incorporate many new features to which I will later refer.

With the wider acceptance of cargo unitisation, many shipowners introduced conventional cargo ships by providing suitable lifting facilities and wide hatches to give a more open ship for spot loading of cargo. Some shipowners perhaps, believing that the transition period between conventional and intermodal transportation concepts would take some considerable time, built new vessels designed to bridge the gap. However, rapid conversion to fully intermodal concept in some trades, e.g. U.K./ Australia, has relegated even some of the newer open type vessels to what could be considered a second class role in a first class service.

In describing the General Cargo Operations on the Australian Coast, it would be preferable to refer first to the domestic trade because developments in this sector were not without impact on later developments in the Australia/ Overseas General Cargo trades.

In post war years and before 1959, the general cargo trade on the Australian Coast was battling for survival against fierce competition from road and rail. Apart from the operation of small specialised bulk carriers which replaced Australian and overseas chartered break/bulk general cargo vessels, Australian shipowners were experiencing grave problems in keeping their ships employed. Many were sold and not replaced. Some well known companies withdrew from the coastal shipping field and others combined to form new companies.

The first major change took place in 1959, when the Australian Shipbuilding Board handed over to the newly formed Australian National Line, the vehicle deck cargo passenger ferry "Princess of Tasmania". In addition to pioneering the vehicle deck concept, this vessel introduced unitised cargo operations on the Australian coast and started the trend in Australia towards construction of specially equipped berths with large land back up areas.

It should be particularly noted that the "Princess of Tasmania", in so far as general cargo operations are concerned, was, and still is a trailership; i.e. practically all cargo is carried on wheels.

Following strong cargo shipper support in this particular trade, the "Princess of Tasmania" was quickly followed by the vehicle deck cargo vessel "Bass Trader". The introduction of this latter vessel in 1961 created a great deal of interest in the shipping world on account of the relatively large number of unique features and innovations incorporated in her design and operation.

A detailed appreciation of "Bass Trader" design is well outside the scope of this particular paper; however, it can be said that in taking "Bardic Ferry" as the basic design, special attention was given to increasing the cargo capacity and deadweight of "Bass Trader". This was achieved by providing in addition to the vehicle deck and crane deck, a lower hold equipped with mechanical stowage facilities and the adoption of light weight high speed main and auxiliary machinery to permit increased cargo carrying deadweight. Furthermore, in order to speed turn-round in cargo loading and to provide better utilisation of vehicle deck space, the main deck was designed to provide direct entry of large fork lifts carrying a unit load of 13 tons max. weight. Experience gained on this particular vessel with the fork lift operation greatly influenced the subsequent design concepts of vehicle deck vessels both here and overseas.

The "Princess of Tasmania" and "Bass Trader" are still serving Tasmania in the Searoad Service and have contributed greatly to the development of this island state. Despite continually rising costs and employment of unsuitable support tonnage, freight rates have been held until recently at substantially the same level since the introduction of this service.

Together, these two vessels established the 14'-5" "Lancashire" type flat and "Railroader" from the mainland to Tasmania service. The unit is still popular with many shippers despite the more recent introduction of the 16'-8" Australian standard flat for coastal operations and the 20'-0" I.S.O. standard flat and container in overseas and feeder operations.

It is also worth noting, that in the same year that "Bass Trader" was commissioned, the Adelaide Steamship Company commissioned their 869 ton D.W. vehicle deck ship "Troubridge" for service between Adelaide, Port Lincoln and Kangaroo Island. This vessel like "Bardic Ferry" was specially designed as a trailer ship and shore based ramps located at each terminal port provided access to both the vehicle and after shelter decks. To cater for this particular trade, the Adelaide Steamship Company purchased the required number of trailers and prime movers, thereby establishing one of the first, if not the first, integrated services under a single ownership in Australia.

In 1964, Associated Steamship Pty. Ltd. introduced the first cellular container ship on the Australian coast for service between Melbourne and Fremantle. This vessel M.V. "Kooringa" closely followed the cellular ship design concept originated in the U.S.A., including the provision of shipboard gantry cranes, and was the first cellular container vessel to be designed as such "from the keel up".

"Kooringa", when first commissioned, carried 16'8" x 8'6" x 8'0" module containers, which was the accepted Australian standard at that time. She was subsequently converted for carriage of I.S.O. standard boxes following Associated Steamship Pty. Ltd's. participation in coastal feeder services, and the establishment of giant shore installed Portainer cranes similar to those introduced to the Matson Line's West Coast/Hawaii service.

In the same year that "Kooringa" was commissioned, the Union Steamship Company of New Zealand Ltd. introduced to their Melbourne/Hobart and Sydney/Hobart services, the "Seaway King" and "Seaway Queen". These vessels incorporated within their design, stern loading facilities supplemented by a conventional hold arrangement served by shipboard jib cranes. In these vessels the forward hold is served by 5 and 10 ton jib cranes. A much larger after hold and 'tween deck area is served by 10 and 15 ton jib cranes. Wheeled cargo operations can extend from stern door to after bulkhead of No. 1 holds.

In January, 1965, A.N.L. commissioned the vehicle deck cargo passenger vessel "Empress of Australia" for service between Sydney and Tasmania. Apart from passenger and trade cars, plus one or two trailers, this vessels cargo working procedure was confined to fork lift operation. During subsequent service experience, developments relating to strengthening of vehicle deck, associated with "double stacking" of cargo led to the introduction of a new type of vehicle deck vessel capable of carrying double stacked units of standard form based on a fork lift handling operation.

In 1969 A.N.L's. newly commissioned vehicle deck cargo passenger vessel "Australian Trader" joined "Princess of Tasmania" and "Bass Trader" in the Melbourne/Tasmanian Searoad Service. In the same year "Brisbane Trader" and "Sydney Trader" formed part of A.N.L's. extended operations around the coast. These vessels, as well as "Townsville Trader" which was commissioned in 1970, follow the "Empress of Australia" developments and can carry double stacked units of standard form totalling 36 tons, as well as a relatively large number of cars stowed in car flats below main vehicle deck, and a mezzanine deck located forward.

Also in 1969, Associated Steamship Pty. Ltd. commissioned two more cellular container vessels for the feeder cargo and domestic service to Brisbane, Sydney, Melbourne and Fremantle. These vessels, namely the "Kanimbla" and "Manoora" were basically designed to carry I.S.O. standard containers, and in addition, they are also capable of stowing numbers of the small 6'0" x 6'0" x 4'0" containers in two bays set aside for this purpose. Like "Kooringa", and in keeping with present day trends, these vessels are gearless and fully dependent on established terminals equipped with gantry portainer cranes.

During the current year (1970), A.N.L. introduced to the Darwin trade, the cellular container/bulk cargo vessel "Darwin Trader". This vessel was specially designed to carry 230 standard 20-0" I.S.O. containers in cellular holds and on hatches over these holds. No. 1 hold is equipped for cellular stowage of 10'-0" I.S.O. boxes and No. 2 hold, together with the empty ore hold Nos. 5 and 7 are available for pre-slung and unitised forms of cargo. This vessel is also designed to carry 10,300 tons of ore cargo on southbound voyage and is equipped with two travelling gantry cranes suitable for handling up to 35 ton loads. No. 1 hatch is served by a 12-1/2 ton jib crane carried "piggy-back" fashion on the forward gantry crane. This vessel is a good example of a ship designed to meet the requirements of a widely differing two-way trade.

Turning now to vessels on order or under consideration, the vehicle deck vessel "Mary Holyman" is due for delivery in early 1971, for the Adelaide/Tasmania trade of William Holyman & Sons Pty. Ltd. This vessel will have a cargo carrying capacity of 156 I.S.O. containers or 199 Australian 16'8" containers and features a specially designed stern ramp for operation over a wide range of tidal and draught conditions. The main vehicle deck and lower hold are suitable for two tier stacking of unitised cargo, a fixed ramp being provided for access to the lower hold. Wheeled vehicles will be stowed on the weather deck via a hydraulic ramp.

The Australian National Line have announced their intention to build two 7,500 ton D.W. vehicle deck vessels specially designed and equipped for carriage of steel coils and other steel products for John Lysaght (Aust.) Ltd. between Port Kembla, Westernport Bay and Adelaide. Perhaps the most interesting feature concerning these particular vessels will be the cargo stowage and securing arrangements.

B.H.P. have also announced their intention to build two vehicle deck vessels for coastal distribution of their steel products. These ships will have a deadweight capacity in the vicinity of 13,000 tons. Cargo will be loaded through the stern door via an angled shipboard ramp. A special feature of these vessels will be the provision of overhead gantry cranes within the vehicle deck for transferring cargo from the stern door to the vehicle deck and lower hold.

The Union Steamship Company of New Zealand Ltd. has recently announced their intention to build a vehicle deck ship to augment its present Sydney and Melbourne to Hobart service. This vessel will have a carrying capacity of 3,800 tons and in addition to a 36'-0" wide stern door, will feature port and starboard side doors 15'-0" high by 20'-0" wide, to give access to the main vehicle deck. The upper deck will be served by a 25 ton shipboard crane. Internal ramps will provide access for wheeled vehicles to spaces located below the main vehicle deck. A possible decision to install gas turbines in this vessel and the two B.H.P. vessels previously referred to has attracted international interest.

Before leaving the coastal trade, perhaps the most interesting project under consideration in the Australian scene, is the proposal by State Shipping Service of Western Australia to build two LASH (LIGHTER ABOARD SHIP) vessels designed to carry 250 ton barges on their western seaboard trade, terminating at Fremantle and Darwin.

The need to service relatively undeveloped ports, coupled with exceptionally wide variations in tide level, considerably influenced State Shipping's interest in a "LASH" concept.

An interesting feature of this concept is the ability to service the two extremes of:

(a) Highly developed ports with associated feeder waterways,

and (b) undeveloped coastal areas.

The introduction of a capital intensive "LASH" system in the West Coast Service would undoubtedly result in faster turn-rounds and better service, in what must be one of the most difficult coastal operations in the world today. There are those, however, who consider that the amount of capital required to put a "LASH" system into operation would be better spent on improving port facilities associated with unit carriers of more conventional design such as the "Scandia" type.

## GENERAL COMMENTS - COASTAL SCENE

All things considered, I think you will agree with me that surviving shipowners currently engaged in the coastal general cargo trade have done much to promote efficiency at a level equal to anywhere in the world today.

The rapid and far reaching changes in the design of ships have affected those who man the ships to a great degree. Not so very long ago, a ship's crew was expected to keep their particular vessel operating with minimum reliance on shore support. By today's standards, crews were larger and shipboard organisation was divided into various departments. Traditional thinking ran deep and the seafarer belonged to a breed apart from most other fields of human endeavour.

Today, we talk about the rapid changes in marine technology associated with the design and running of ships; however, those of us who have been long associated with the industry must surely agree that it is only in recent years, that technological advances calling for changes in role and attitude long since established in shore industry have been accepted and introduced by ship owning interests. It is a well known and established fact, that as a result of these changes, new ships can be operated with considerably reduced crews; this applies particularly to specialised vessels geared into a regular trade with well organised shore support.

With seven different unions involved in the manning of Australian flag ships, it is exceptionally difficult and, unfortunately, sometimes impossible, to negotitate manning agreements which would favourably compare with agreements recently negotiated by progressive foreign flag shipping interests. Furthermore, with such a divided interest in the welfare of a single ship's company, it is difficult to introduce training programmes directed towards increased productivity, job satisfaction, and personal advancement of many Australian seafarers.

The Australian flag vessel venturing into world competition must not be handicapped by inter-departmental demarcation which cannot logically be justified or even related to an Australian way of life, and it is, therefore, essential for management and union leaders to get together in a special effort, to clear this vexatious problem in the early seventies.

In regard to competition with other forms of transport, both coastal and overseas, the Australian flag vessel operates to some disadvantage in many areas.

Although the coastal trade is protected from foreign flag intervention, it is not a subsidised trade, despite the fact that in a number of trades it is in competition against subsidised modes of land transport. Furthermore, vessels permanently sailing on the coast must be built in Australia to protect a struggling shipbuilding industry. Vessels can be imported under special circumstances, but such ships must eventually be replaced by new tonnage built in Australia.

Australian shipowners feel that more could be done to assist their industry, bearing in mind that most overseas maritime nations give assistance in one or more of the following forms:

(a) Long term shipbuilding finance at Government supported low interest rates,

(b) Liberal depreciation allowances,

(c) Investment grants and subsidies,

(d) Scrapping allowances,

(e) Other forms of assistance.

Contrary to popular belief, the above-mentioned financial aspects can have a much more important bearing on the competitive position of the Australian flag vessel than manning, running and operating costs.

AUSTRALIA OVERSEAS TRADE

As stated earlier in the paper, the progressive developments on the Australian Coastal Scene influenced at least some of the decisions taken on the overseas trade.

For example, the Australian National Line in partnership with "K" Line of Japan and Flinders Shipping Co. Pty. Ltd. of Australia, selected vehicle deck vessels for their Eastern Searoad Service to Japan, having regard for the experience gained and facilities already established on the Australian Coast in connection with this type of vessel. The E.S.S. vessels use the existing A.N.L. managed Terminals in Australia. Terminal facilities in Japan are leased to and managed by "K" Line.

The first vessel, "Australian Enterprise", owned by A.N.L. was commissioned on 27th August, 1969; the second vessel, "Australian Searoader", owned by "K" Line was commissioned on the 20th October, 1969. "Matthew Flinders", owned by Flinders Shipping Co. Pty. Ltd. entered service on 22nd June, 1970. It is expected that a fourth vehicle deck vessel will be introduced in the E.S.S. service in the near future.

Built in Japan in accordance with A.N.L. design requirements, the vessels already in service are capable of carrying approximately 600 standard I.S.O. unit containers or flats, including 110 refrigerated containers. Provision is also made for the carriage of a limited number of 40'-0" boxes on the crane deck. In addition, folding car platforms located in the foreward section of the main vehicle deck are capable of carrying 110 cars. Each ship has 3 decks, viz. upper or crane decks capable of carrying containers up to 3 high; main and lower vehicle decks, the latter being served by an internal rampway; both vehicle decks are designed to carry CONTAINERS STACKED 2 HIGH. ACCESS TO THE MAIN VEHICLE DECK IS THROUGH A LARGE STERN DOOR 38'-0" WIDE BY 19'-6" HIG containers stacked 2 high. Access to the main vehicle deck is through a large stern door 38'-0" wide by 19'6" high.

The upper vehicle deck is loaded direct by fork lifts in accordance with established A.N.L. practice and the lower vehicle deck is stowed by fork lifts from trailers using the internal rampway, to which we previously referred. Specially designed fork lifts, incorporating such features as small turning circle, low front axle loading, side shift and angle shift, double stack cargo units throughout the vehicle decks.

The service experience with E.S.S. vessels clearly indicates that when working the upper deck with a shore-based crane and vehicle decks with fork lifts, a loading and discharging rate can be obtained far in excess of that experienced with other forms of specialised unit carriers including cellular vessels.

An average service speed of 21½ knots enables E.S.S. vessels to complete round voyages between 28 and 30 days, serving Sydney - Melbourne - Sydney - Brisbane on the southbound leg, and Yokkaichi - Nagoya - Yokohama - Osaka on the northbound leg.

The vessels can, of course, carry any form of cargo capable of being loaded on wheels and rolled into the ship; however, the principle underlying the design, was to use all available space in the vessel by adopting standard units capable of being double stacked in the vehicle deck area. It is worth noting that this feature distinguishes these particular vessels from vehicle deck trailer vessels of similar appearance operating overseas, as for example, in the Transatlantic trades.

In the Australian/Japan trade, the Eastern Searoad Service vehicle deck ships are competing against five cellular container ships of much larger dimensions, and each capable of carrying approximately 1000 I.S.O. 20'-0" containers. Three of these vessels are Japanese owned and the remaining two by European interests. These vessels use established cellular container ship terminal facilities at Sydney, Melbourne and Brisbane in Australia, and Yokkaichi, Nagoya, Yokahama and Osaka in Japan.

In the Australia to Europe trade, the introduction of large cellular container vessels has had a tremendous impact on the Australian scene. These vessels are similar in design concept to Associated Steamships "Kooringa", "Kanimbla" and "Manoora". However, they are much larger vessels and are capable of carrying between 1300 and 1500 I.S.O. 20'-0" containers. A special feature worthy of note is a rather unique method of connecting insulated containers to a shipboard cooled air ducting system.

Already in service are six vessels owned by Overseas Container Ltd. (a consortium comprising British and Commonwealth, Ocean Steamship, Furness Withy, and P. and O.) two vessels operated by Associated Container Transportation Australia (a consortium comprising Blue Star, Cunard and Ellerman Lines, and one vessel owned by The Australian National Line.

In addition, Seabridge Australia representing Hapag Lloyd AG; Koninklijke Nedlloyd nv; Messageries Maritimes and

Lloyd Triestino will shortly have five vessels, making a total of fourteen vessels in this particular trade. These consortium and companies have formed a single organisation for the running of their container service, which is known as the Australia Europe Container Service. The A.E.C.S. service commenced on 1st September and a 5 - 6 day frequency of service is expected by mid '71. Each representative organisation in Australia retains responsibility for its own marketing and through transport.

Ports of call covered by the Australian Container Service include Sydney, Melbourne, Fremantle, Antwerp, Rotterdam, Bremerhaven, Hamburg, London. The container ports of Flushing and Zeebrugge will also be served when they become operational.

All ports provide containership facilities, including large gantry cranes capable of lifting one or two containers per cycle. The vessels have an average speed of about 21 to 22 knots and an approximate round voyage time of around 63 to 65 days.

In regard to performance; it has been estimated that one of these vessels would carry as much cargo in a year as four conventional ships previously engaged in this trade.

Apart from U.K. and continental shipowning interests, a Scandanavian consortium consisting of East Asiatic Company of Denmark, Transatlantic Steamship Company of Sweden and Wilhelm Wilhelmson of Norway, have ordered five vehicle deck ships for the Australia/Europe trade. The service by these ships will commence in 1972. These vessels will be of equivalent capacity and speed to the cellular container ships in service and proposed for the service, and it is interesting to note that the consortium who call themselves Scandinavian Australia Carriers Ltd. (Scanaustral) have stated their intention to compete against the cellular container ship by offering a wider range of ports, and more flexibility in regards to unit form of cargo carried. The proposed vessels will be equipped with an angled stern ramp and inbuilt rampways connecting five decks. They will not require a shore ramp or crane facilities.

In the Australia/North America Service large cellular container ships and vehicle deck vessels again of equivalent capacity are proposed. A new service to the West Coast of North America, known as Pacific Australia Direct Line, shortened to P.A.D., will commence at the beginning of 1971 and comprise three 20,500 tons d.w. ships of the vehicle deck quarter ramp type, similar to the proposed SCAN-AUSTRAL vessels. One will be owned by the Swedish Transatlantic Line, one by A.C.T.A. and one by the Australian interests A.N.L., Elder Smith and Trans-Austral; the latter being an Australian subsidiary of Swedish Transatlantic.

The vehicle deck vessels intended for P.A.D. Service have been designed to serve as many as 17 different ports in a round voyage lasting 60 days. In order to cope more effectively with multiport operations, 5 vehicle decks are incorporated in the overall design. The vessels will carry a large variety of cargoes presented in standard and non-standard forms. For example, a large percentage of the cargo loaded in the west coast of America will be timber and much of the cargo loaded in Australia will be palletised and block stowed in the ships. Loading/discharging rates in such circumstances will not be as high as those achieved by vessels carrying standard cargo units, such as containers, between a limited number of super ports. Having regard to the large number of ports to be visited and the variety of cargo presentation, these vessels will carry their own cargo handling units, such as low height straddle carriers, fork lifts of various capacities and a sideloader specially designed for operations in vehicle deck areas. Trans Austral will be responsible for co-ordinating this particular service.

For the service in the Australia/E.C.N.A. trade, 12 cellular container vessels have already been ordered. It is expected that the German owned Columbus Line will commission in April, 1971, the first of three vessels currently under construction in Germany. These vessels will carry 1180 - 20'-0" containers, and unlike other large container vessels previously referred to, shipboard container cranes will be installed in order to enable Columbus to service North Queensland ports where large shore-based gantry cranes are not available. The service speed of these vessels will be 22 knots. 11.

Farrell Lines, the U.S. flag carrier, also expect to commission in 1971, four vessels each with a capacity of 978 - 20'0" containers. In addition to the cellular holds, provision will be made for carriage of general cargo.

The remaining five vessels will have a capacity of 1170 - 20'0" containers and operate in the Pacific America Container Express (P.A.C.E.) service, covering Australia, New Zealand and East Coast North America ports. Of the five vessels, three will be owned by A.C.T.A. and one each by O.C.L. and A.N.L. Unlike the Australia/Europe vessels, the PACE vessels will be provided with break bulk cargo space in the forward hold served by shipboard cranes. The same type of equipment will be installed for carriage of refrigerated containers, but these vessels will carry a greater number of refrigerated units than Australia U.K./ Europe vessels. In this particular trade, it is also expected that the 40'-0" box will become increasingly popular because of influence from the American side. The service speed of these vessels will be 22 knots.

## GENERAL COMMENTS - OVERSEAS GENERAL CARGO TRADE

The amalgamation of shipping companies into group organisations sharing with other group organisations the same port facilities, is a particularly interesting feature of the Australia - U.K. - European container cargo trade. It is, however, not without precedent.

As a pace setter in intermodal transportation, Sea-Land with full control of its door-to-door services as developed in its domestic trade, introduced container ships to the North Atlantic trade. Sea-Land was quickly followed by other American flag operators seeking to re-establish the U.S. Merchant Marine in the North Atlantic trade by taking full advantage of postwar technical innovations developed in their domestic trade. To meet this challenge, Scandanavian and North European shipowners, who for many years competed with each other, formed the Atlantic Container Line to challenge the Americans. The battle today continues, and like most pioneer efforts, there have been casualties; the most noteworthy being the complete withdrawal of the well-known American flag operator, Moore McCormack, who has been forced to sell four almost new vessels specifically designed for the trade to another American flag operator, for service in the Mediterranean.

There are few individual shipowners, if any, experienced and powerful enough to set up a container service comparable in scope and efficiency to that now being provided and proposed by the powerful American operators such as Sea-Land and Sea-Train.

To achieve the full benefits of modern inter-modal transport, all links in the transportation chain must operate at the highest level of efficiency from cargo procurement right through to final distribution. While the most startling developments can be related to the sea link, it is the land-based links which have given rise to the most concern. The reasons for this are many; some objective, but some, unfortunately, subjective.

Some people may say that experience so far has shown that containerisation in Australia and overseas may have been pushed a little too quickly, not allowing sufficient time for gradual phasing out of the old established practices, and introduction of the new ones. A further criticism, is that in this change-over process, some sections of the community have experienced problems which could have been avoided. On the other hand, important technological changes can always be expected to produce an element of opposition and discontent requiring time for adjustment and change of attitudes. In the long run, however, benefits of intermodal transport should more than justify the introduction of the system and the efforts of those who are currently tackling the many problems and side issues associated with this transition.

The setting up of a purely container service requires extremely heavy capital outlays. For example, behind the Australia/Europe Container service is a total investment of more than $300 million. This modern expensive and sophisticated system of transportation requires a very high utilisation factor before it can show any return on invested capital. The capital required for the establishment of terminal and depot facilities can only be recovered by revenue generated by the throughput and the higher the number of containers passing through, the lower the cost per unit. The need for large throughput, as well as for high capital outlays, is forcing the formation of large shipping groups. It also provides reasons why more gradual, piece-meal introduction would prove more costly.

Compared with conventional shipping, the container groups employ less men in cargo handling areas. This, however, does not tend to reduce the incidence of chronic industrial troubles. Indeed, on the contrary; fewer numbers of men employed tends to make the industry much more vulnerable to industrial action. Under such conditions, strong pressure for concessions and high wages, out of proportion to those that can be afforded by the rest of the industry, must be a cause for concern by those responsible for maintaining a satisfactory balance governing the industry as a whole.

Today, technically and operationally, any ship-owner contemplating a new trade or revitalising an existing trade by introducing specialised tonnage, has a number of options open to him; e.g. cellular container vessel vehicle, vehicle deck vessel, barge carrier, pallet ship, etc. However, it may well be that the best solution will be a vessel which incorporates the special features of two or more of the recognised types referred to. The resultant vessel would, of course, be a "hybrid" type and it should be noted that the more recently introduced vehicle deck vessels now operated on the Australian coast are in fact "hybrid" types, developed from the vehicle ferry (carrying trailers and cars) to the horizontal cellular stow concept without wheels.

"Hybrid" ships are receiving more and more attention today and a number of these vessels have appeared on the International trade.

The enclosed chart "Relationship between cargo units, Sea Transport Systems, Ship Types" is produced by courtesy of Maritime Transport Research (U.K.) and clearly illustrates the importance of extending any feasibility study beyond considering only basic types of vessels.

The foregoing developments in the general cargo trade are unparalleled in the field of Marine transportation. The next decade into the seventies will no doubt prove many things; the most important being the capacity and capability of shipowners involved in these changes to demonstrate that what has been done can be fully justified from the point of view of the customer. This will be no small task, involving as it does the satisfaction of the shipping community as a whole, calling for the establishment of integrated feeder services and a freight rate not less favourable than that previously experienced with conventional shipping. I would predict that the period into the seventies will be one of consolidation and gradual improvement in which the manager, the engineer, the union leader and the economist will each have a part to play.

Time and the scope of this paper do not permit further elaboration in the field of general cargo carriage; however, the brief outline of what is happening today can be taken as an indication of events into the seventies.

## PORT DEVELOPMENT - AUSTRALIA & OVERSEAS

The rapid changes in the design of ships and improved cargo handling techniques cannot yield their maximum benefits, unless there is a corresponding development of facilities provided by many port authorities throughout the world. As is the case with shipowners, in order to compete satisfactorily, large amounts of finance are required to meet present day and future needs.

Over the past years, large numbers of ports of various sizes have developed to satisfy the needs of local communities and industrial organisations. Recently, this established pattern has changed, in that, the trend is for larger and faster vessels to visit a smaller number of highly developed ports. Port authorities in seeking to attract these new vessels are forced to spend large amounts of capital in equipping and modernising their facilities to suit the needs of ship and land transport operators. In order to ensure a reasonable return on capital invested, such facilities must be fully utilised by a number of shipowners or group organisations in most cases on a 24 hour basis.

The development of these so called super ports is threatening the existence of many smaller established ports. It is envisaged that shipowners in conjunction with some of these smaller ports will establish feeder services to the major ports. However, competition from land transport then becomes an additional threat to their existence.

The new era of specialised port facilities as far as Australia was concerned commenced in 1959, when the Melbourne Harbour Trust and Marine Board of Devonport provided special terminal facilities with adequate land back-up marshalling areas for the Searoad Service introduced by A.N.L.'s vehicle deck vessel "Princess of Tasmania".

The provision of considerable acreages of land for modern terminal facilities and of deeper and larger berths and turning basins to cater for bigger vessels has heavily taxed and strained the abilities of many harbour authorities to keep up with demand for extensions and modernisations of their ports. There are, of course, physical, as well as financial limitations on how far this harbour "evolutionary" process can be carried out. A good example of this is Sydney, our busiest and biggest general cargo port, which will be transferring part of its growing shipping activities to the Botany Bay, where large areas of land are available for port and industrial development. The seventies will see the early development of Botany Bay as a deep water port.

The development of large bulk carriers has also wrought great changes. Advances in loading and discharging equipment mean that a 'bulk' port need only be pipeline or conveyor belt from shore to a sheltered mooring place. The size of ships has necessitated much greater dredging in the harbours and approach channels. In the port areas, there must be room for very large stockpiles, etc., and the tendency has been to establish entirely new ports in close proximity to the mineral discoveries, this being particularly evident in the north of Western Australia. The capital expenditure in cases like this is immense, as it is necessary to build entire new townships as well as land transport such as railways to the actual mine. However, without the economies resulting from such large scale operations, Australian ore would not be competitive on the international market.

## CONCLUSION

Annual growth in world trade is the most significant single factor leading to most recent developments in the field of Marine Transportation.

The world fleet of large passenger vessels is rapidly decreasing and will continue to do so, especially with the introduction of large jumbo type jet aircraft. However, smaller, well appointed cruise liners designed to attract holiday-makers will become increasingly popular in the 70's.

The most interesting development in the tanker field is the tremendous increase in size of individual vessels. It is likely that most of the large tankers built in the 70's will be between 200-300,000 dwt., although we can expect a relatively small number of larger vessels designed for a specific service route. Not mentioned in the paper, is the possibility of legislation to control the extent of pollution resulting from serious mishap in port or at sea and which may well restrict the size of tanker operating in defined areas.

Dry bulk carriers have considerably increased in size, but not to the same extent as tankers. Large bulk carriers ordered in the 70's are likely to be around 100-150,000 dwt., with a much smaller number between 150-200,000 dwt. However, ore bulk oil carriers of between 200-300,000 dwt., using off-shore loading and discharge facilities will appear in increasing numbers in the 70's.

In the general cargo field, the last decade has seen the introduction and complete acceptance of unitised cargo procedures. More recent developments have been directed towards introducing highly developed capital intensive intermodal transport systems, involving practically all forms of transport on sea, land and in the air. A considerable part of the seventies will be devoted to consolidation and refining of recently developed systems in the light of experience gained. This will be no mean task, bearing in mind, that in the past, it was possible to bring about changes in one or other mode of transport without having too great an effect on the other, whereas in the consolidating and refining process referred to, innovations introduced must be considered in terms of their effect on complete systems.

Few individual transport companies are capable of setting up an intermodular transportation system in international trade. Apart from a high financial outlay, an intermodal transport operator must be influencial enough to direct and control the complete system. The road transport operator introducing a sea link to his operations appears to be more attuned to the requirements of a door-to-door concept than the traditionally established shipowner seeking to extend his activities into land transport.

Of special significance today is the trend towards government involvement and interest shown towards establishing national flag fleets. Few governments would choose to ignore the far reaching influence on the economy of transportation developments today, and few transport operators in the international field at least would be prepared to gamble huge investments without some form of government assurance or involvement in the areas concerned.

The position of the "cross trader" is becoming increasingly difficult, even in circumstances where he can lay claim to historical rights in a particular trade, unless he is fortunate enough to be able to arrange a mutually convenient partnership with national interests.

There is a possibility that in the seventies, government influences may lead for prestige reasons to the construction of unduly large and expensive national flag carriers operating between super ports in circumstances where purely economic consideration would be of secondary importance. Such vessels can be nuclear powered and capable of carrying 3000/4000 I.S.O. containers at speeds approaching 40 knots. Indeed, such vessels are being specially investigated under government sponsorship outside Australia, and whilst they may bolster national grandeur, they could have a most upsetting influence on present day plans and calculations.

The attached list covering the world containership fleet and order book is reproduced by kind permission of the "Shipbuilding and Shipping Record" and clearly indicates the dramatic increase in numbers, size and speed of this type of vessel, since the introduction of the first generation A.C.L. vessels in the Atlantic trade in 1967.

Although most established general cargo trades will become containerised in the seventies, a fewer number of highly flexible conventional cargo vessels will still be required to play a support role and to provide direct services to outports.

In the seventies, the rapidly expanding steel, coke and coal industry in New South Wales will contribute to the upgrading of Port Kembla and Newcastle, especially the former. Deep water off-shore loading facilities will also appear on the East Coast of Australia capable of accepting vessels in excess of 100,000 tons d.w.t.

We can also expect in the 70's, further upgrading of ore loading ports on the west coast, depending on the stockpile capacity of new and upgraded discharge facilities to be provided in Japan and elsewhere.

In regard to developments overseas, we can expect in the 70's some concentration towards the development of deep water facilities for very large vessels, such as the construction of artificial islands for the stockpiling of bulk materials; these islands, in some instances, will be many miles from the coastline.

In the general cargo trade, trends in shipping, especially containerisation, could see an alteration in the traditional development of industry, etc., around a port, although industry - sea port has always been rather a chicken and egg question. But certainly, in Australia in the past, the convergence of a State rail network on an overseas port has had a strong determining effect on urban and rural development. In future, maybe, the existence of a very small number of "superports" for overseas liner cargo with a large number of regional seaports and inland terminals for domestic cargo, could help to reverse the centralising trend and foster the growth of regional commercial and manufacturing centres. Growth of road and rail feeder services could lead to the development of large mechanised transport facilities in major urban areas <u>not on the coast</u>. It will be interesting to see whether the 70's will produce any evidence of such change.

Without wishing to be unduly pessimistic, some of the smaller ports on the Australian coast could well diminish in importance. While previously, cargo was shipped direct from them to overseas destinations, cargo will now tend to be collected at large ports and transport by road or rail might well be cheaper than by sea. This, however, is more of a social and political problem.

It's an irony of today's development, that while some of the long established ports are declining in importance, others more strategically located, are experiencing such rapid development, that crash programmes for new land development have to be initiated.

As would be expected, new port developments currently being undertaken throughout the world today are also attracting increasing interest at government level, a good example being Japan, where the government have issued policy directives on the implementation of an extensive port development programme.

In this paper I have emphasised the tremendous development over recent years in sea transport, because I feel that this has set the stage for the seventies. Particular attention has been given to developments in Australia, especially in the general cargo trade, bearing in mind these developments had a considerable influence on subsequent decisions in the overseas trade.

A decade ago one was faced with many options in promoting unitised cargo systems. Now decisions have been made and vast sums invested. Interlocking with other forms of transport has further rigidified the situation. The full effect of all these changes has yet to be felt.

In this paper no mention has been made of exotic solutions such as submarine transport, airships and helicopters, large high speed twin hull vessels and hovercraft, etc. It is most unlikely that any of these systems will be developed in this decade on a scale likely to seriously affect what has already been done. To sum up, it would appear that the guidelines for the 1970's have already been set and progress in this decade will be more a matter of degree than of kind.

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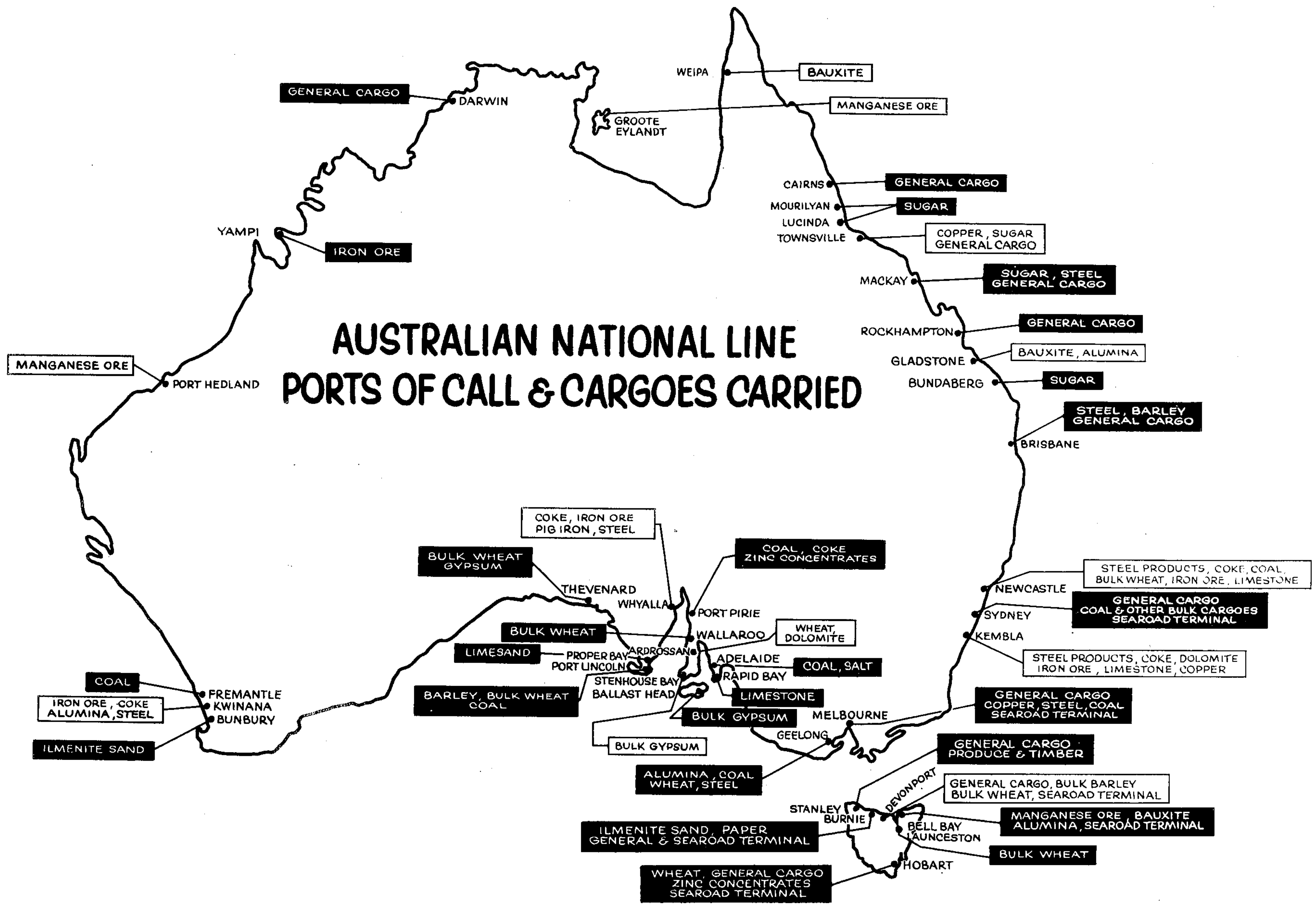
Note: The author wishes to thank the Management and staff of the Australian National Line for assistance given in producing this paper. However, the views expressed and the conclusions drawn are those of the author and do not necessarily reflect the policy of the Australian National Line.

# SUMMARY OF THE AUSTRALIAN TRADING FLEET

Australian trading vessels of 200 tons gross and over comprise the following:

| Vessels | No. | Tons dwt. | Tons gross |
|---|---|---|---|
| 1. Interstate Vessels | | | |
| (a) Australian owned Australian registered vessels. | 85 | 908967 | 673225 |
| (b) Overseas owned Australian registered, engaged in Australian coastal trade; | | | |
| (i) New Zealand owned | 6 | 17247 | 15410 |
| (ii) Others | 9 | 264987 | 167593 |
| (c) Overseas owned overseas registered vessels on charter engaged in Australian Coastal trade. | 6 | 163166 | 100584 |
| TOTAL INTERSTATE FLEET | 106 | 1354367 | 956812 |
| II. Intrastate Vessels | 23 | 126042 | 84474 |
| TOTAL COASTAL TRADING VESSELS | 129 | 1480409 | 1041286 |
| III. Overseas Trading Vessels | | | |
| (a) Australian owned Australian registered, operated mainly in overseas services. | 8 | 66370 | 67244 |
| (b) Australian owned overseas registered, operated wholly in overseas services. | 6 | 55063 | 40907 |
| TOTAL OVERSEAS TRADING VESSELS | 14 | 121433 | 108151 |
| TOTAL AUSTRALIAN TRADING VESSELS | 143 | 1601842 | 1149437 |

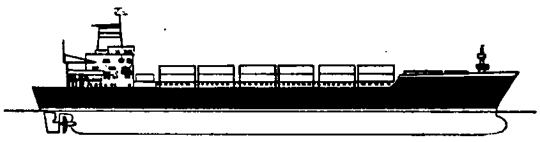
As at 30th June, 1970.
"Australian Shipping 7 Shipbuilding".
23rd Edition Department of Shipping & Transport.




# AUSTRALIAN NATIONAL LINE
# PORTS OF CALL & CARGOES CARRIED

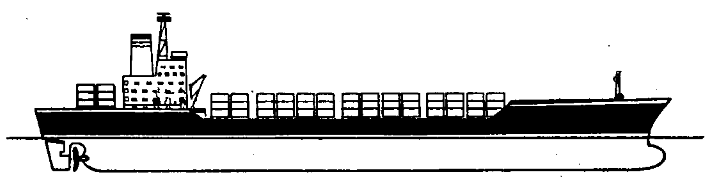
**Cellular Container Ships**
**Source "Marine Engineer & Naval Architect"**
**September, 1969.**

*Sketches, to the same scale, of Hamburg-Amerika Lines' three types of container ship*



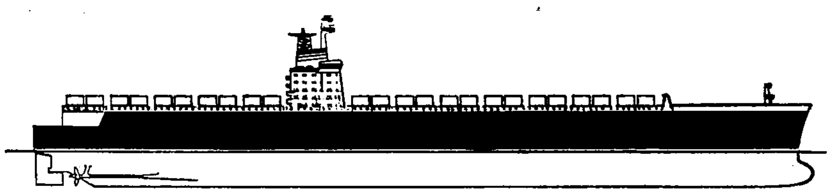
**"Atlantic"**

| | |
|---|---|
| Length overall | 170·8m (500ft 0in) |
| Length bp | 155·0m (508ft 0in) |
| Breadth | 24·5m (80ft 5in) |
| Depth | 14.6m (47ft 11in) |
| Containers, 20ft | 730 |
| Machinery | MAN K9Z78/155E |
| Shp (m) | 15,750 @ 122 rev/min |
| Service speed, knots | 20½ |



**"Australia"**

| | |
|---|---|
| Length overall | 225·0m (737ft 0in) |
| Length bp | 206·1m (675ft 8in) |
| Breadth | 30·45m (100ft 0in) |
| Depth | 16·69m (54ft 6in) |
| Containers, 20ft | 1,300 |
| Machinery | Stal Laval AP 32/140 |
| Shp (m) | 32,450/140 |
| Service speed, knots | 22 |

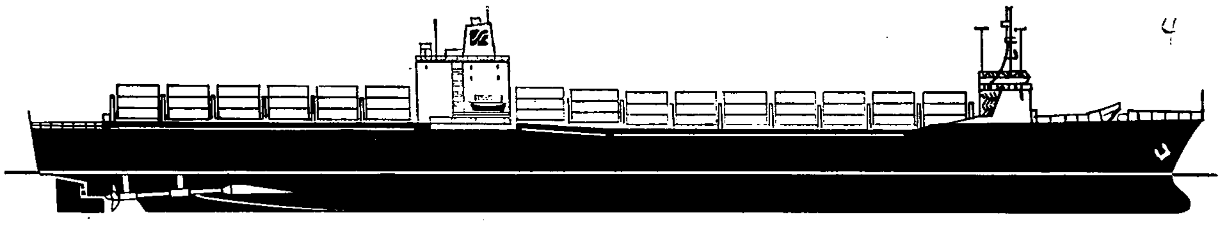


**"Far East"**

| | |
|---|---|
| Length overall | 275·0m (901ft 0in) |
| Length bp | 265·0m (760ft 0in) |
| Breadth | 32·2m (105ft 6in) |
| Depth | 25·0m (82ft 0in) |
| Containers, 20ft | 1,800 |
| Machinery | Twin-screw Stal AP40 |
| Shp (m) | 80,000 |
| Service speed, knots | 26 |

Not to same scale as above

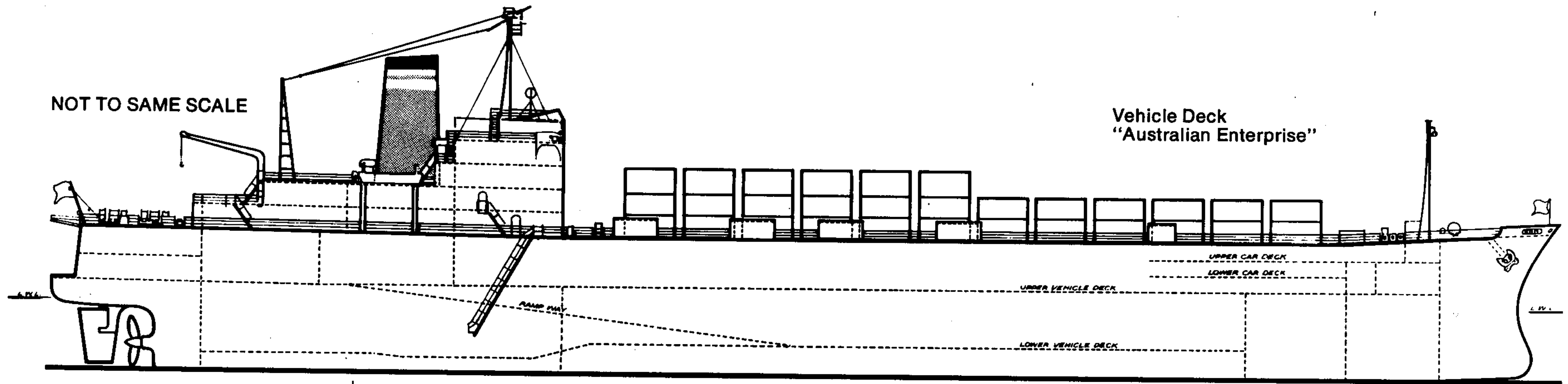
*Profile of Sea-Land's very large transAtlantic and transPacific container ships.*



| | |
|---|---|
| Length overall | 287·73m (911ft 0in) |
| Moulded breadth | 32·16m (105ft 6in) |
| Draught | 9·14m (30ft 0in) |
| Containers (35/40ft) | 1082 |
| Machinery | 120,000shp |
| Service speed | over 30 knots |

ATTACHMENT 3
AUSTRALIAN NATIONAL LINE

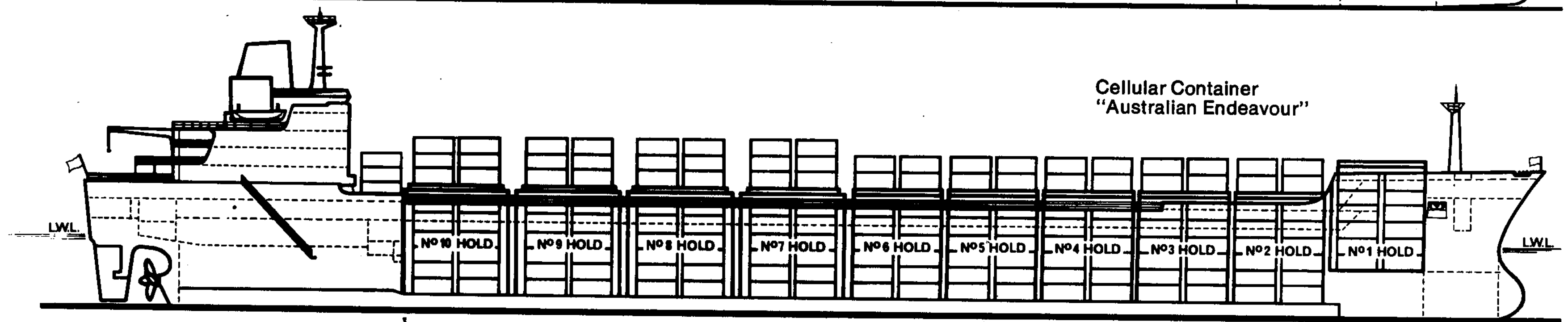
NOT TO SAME SCALE




Vehicle Deck
"Australian Enterprise"

| | |
|---|---|
| Length overall | 596 ft. |
| Length b.p. | 551 ft. |
| Breadth (mld) | 82 ft. |
| Dept (mld. to upper deck) | 53.8 ft. |
| Containers 20′ | 600 |
| Motor Vehicles | 110 |
| Service speed | 21 knots |

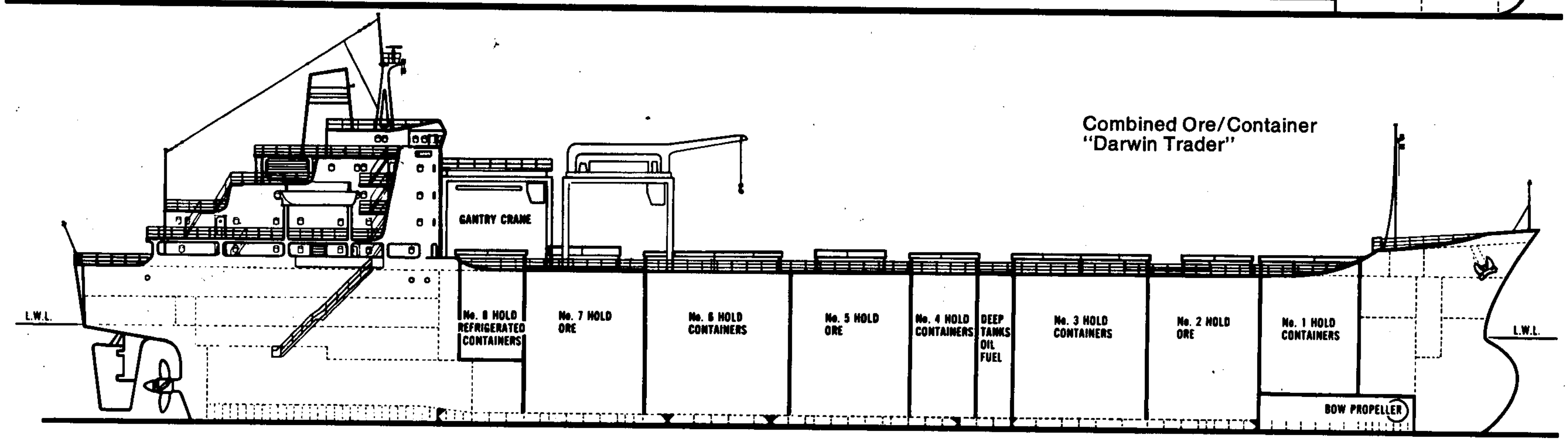
Australia-Japan service




Cellular Container
"Australian Endeavour"

| | |
|---|---|
| Length overall | 712.8 ft. |
| Length b.p. | 675 ft. |
| Breadth (mld) | 95 ft. |
| Depth (mld. to upper deck) | 52.25 ft. |
| Service draft | 32 ft. |
| Service speed | 22 knots |
| Containers 20′ | 1354 |

Australia—U.K./Continent

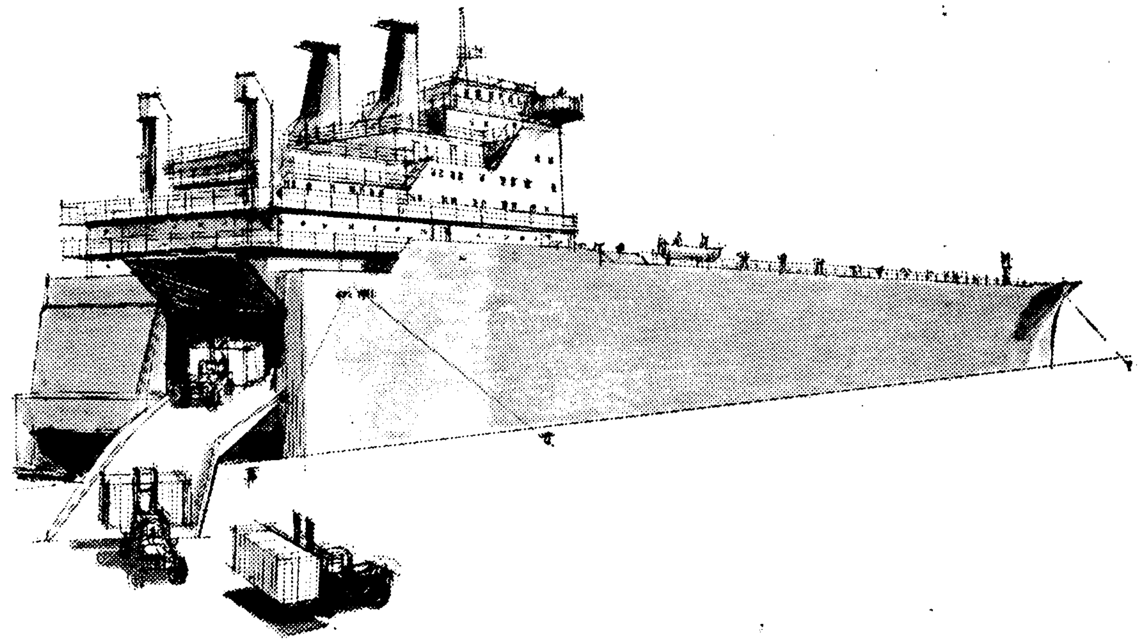



Combined Ore/Container
"Darwin Trader"

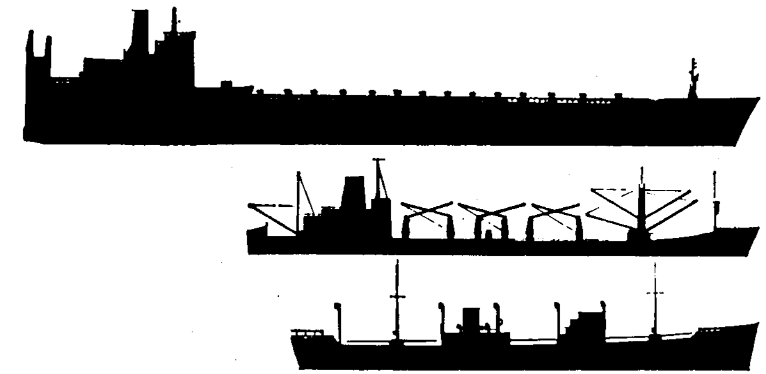
| | |
|---|---|
| Length overall | 458 ft. |
| Length b.p. | 425 ft. |
| Breadth (mld.) | 70 ft. |
| Depth | 47.5 ft. |
| Service speed | 15½ knots |
| Carrying containers: | |
| Dwt. | 8230 tons |
| Draft | 24′3″ |
| Carrying ore: | |
| Dwt. | 11900 |
| Draft | 30′ |

Melbourne-Darwin Service

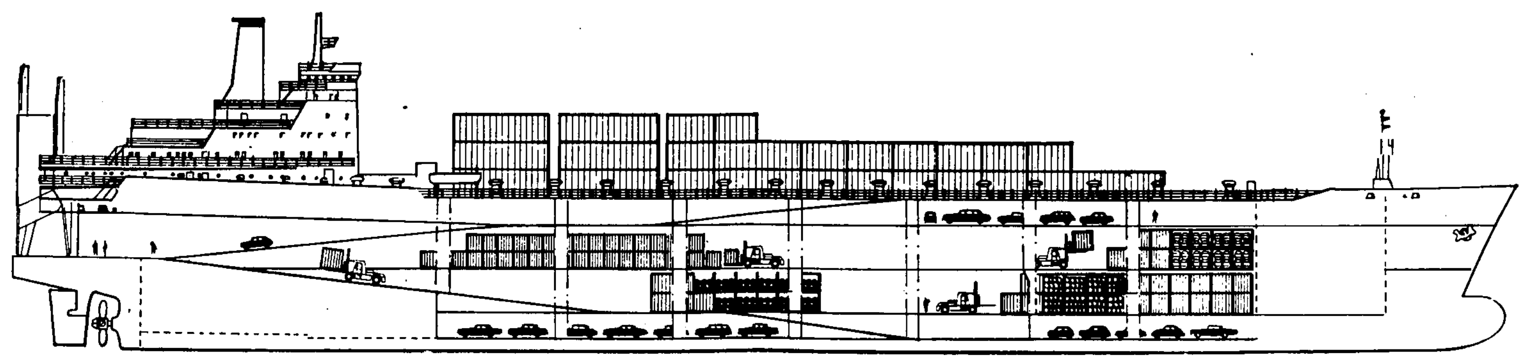
ATTACHMENT 4
VEHICLE DECK
QUARTER RAMP SHIP
Source: "Shipping Coal"
Metals: "The Harbour"
VOL. 51. NO 12 DECEMBER 1969



*The angled ramp at the stern of the new international roll-on roll-off vessels to be built for ScanAustral lets the vessel be loaded over only 180 ft. of wharf space. The ships do not require special facilities. All loading and unloading is by fork-lift trucks and wheeled equipment carried by the vessel.*



*Vessel types used in the Australia/Europe trade by the Scandinavian Lines. East Asiatic Company of Copenhagen, Transatlantic Steamship Co., Go henburg, and Wilh. Wilhelmsen of Oslo. TOP: 20,000-ton roll-on roll-off cargo carrier. MIDDLE: 11,000-ton Scandia type unit-load vessel. LOWER: 8,000-ton conventional cargo vessel.*



*Each of the five roll-on roll-off vessels being ordered for the Australia to Europe trade by ScanAustral will have five decks connected internally by ramps. Loading is through an angled ramp on the starboard side of the vessel at the stern. Each shi p is of 20,000 tons deadweight, length overall 682 ft. 3 in., beam 97 ft. and draught 32 ft. 6 in.*

# World Containership fleet & Orderbook*



| Name or (yard no.) | Owner | Builder | Capacity 20ft ISO | Capacity tons d.w. | Engine M S | Speed Motorship Steamship | In service | Operator |
|---|---|---|---|---|---|---|---|---|
| ATLANTIC SPAN | Transatlantic S.S. | Rheinstahl N.W. | 761* | 16 370 | M | 21½ | 67 | ACL |
| ATLANTIC SONG | Wallenius | France-Gironde | 761* | 15 755 | M | 21½ | 67 | ACL |
| ATLANTIC SAGA | Broström | Götaverken Gp. | 761* | 15 725 | M | 21½ | 67 | ACL |
| ATLANTIC STAR | Holland-Amerika | France-Gironde | 761* | 15 755 | M | 21½ | 67 | ACL |
| ATLANTIC CAUSEWAY | Cunard | Swan Hunter | 962* | 18 219 | S | 24¼ | 69 | ACL |
| ATLANTIC CROWN | Holland-Amerika | France-Gironde | 962* | 18 511 | S | 24¼ | 69 | ACL |
| ATLANTIC CHAMPAGNE | C.G.T. | Atlantique | 962* | 18 500 | S | 24¼ | 69 | ACL |
| ATLANTIC CINDERELLA | Wallenius | France-Gironde | 962* | 18 510 | S | 24¼ | 70 | ACL |
| ATLANTIC CONVEYOR | Cunard | Swan Hunter | 962* | 18 220 | S | 24¼ | 70 | ACL |
| ATLANTIC COGNAC | C.G.T. | La Ciotat | 962* | 18 500 | S | 24¼ | 70 | ACL |
| ACT 1 | A.C.T. | Bremer Vulkan | 1 223 | 26 400 | S | 22½ | 69 | ACS |
| ACT 2 | A.C.T. | Bremer Vulkan | 1 223 | 26 400 | S | 22½ | 69 | ACS |
| (970) | A.C.T. | Bremer Vulkan | 1 040 | 24 000 | S | 22¾ | 71 | [redacted] PACE |
| (971) | A.C.T. | Bremer Vulkan | 1 040 | 24 000 | S | 22¾ | 71 | [redacted] PACE |
| (41) | A.C.T. | Swan Hunter | 1 420 | 30 000 | S | 23 | 73 | ACT |
| (43) | A.C.T. | Swan Hunter | 1 420 | 30 000 | S | 23 | 74 | ACT |
| (657) | A.C.T. | Eriksberg M.V. | 1 200* | 24 000 | M | 22 | 71 | PAD LINE |
| C.V. SEA WITCH | A.E.I.L. | Bath I.W. | 928 | 16 340 | S | 20 | 69 | CML |
| C.V. LIGHTNING | A.E.I.L. | Bath I.W. | 928 | 16 340 | S | 20 | 69 | CML |
| C.V. STAGHOUND | A.E.I.L. | Bath I.W. | 928 | 16 340 | S | 20 | 69 | CML |
| AUSTRALIAN ENDEAVOUR | A.N.L. | Bremer Vulkan | 1 223 | 26 400 | S | 22½ | 69 | ACS |
| AUSTRALIAN ENTERPRISE | A.N.L. | Kawasaki | 560* | 11 400 | M | 21 | 69 | SEAROAD |
| (973) | A.N.L. | Bremer Vulkan | 1 040 | 24 000 | S | 22¾ | 72 | [redacted] PACE |
| (1184) | A.P.L. | Ingalls | 978† | 19 750 | S | 23 | 71 | APL |
| (1185) | A.P.L. | Ingalls | 978† | 19 750 | S | 23 | 72 | APL |
| (1186) | A.P.L. | Ingalls | 978† | 19 750 | S | 23 | 72 | APL |
| (4242) | Bahamas Ocean Dev. | Italcantieri | 1 400 | 29 710 | S | 23 | 70 | CML |
| (4243) | Bahamas Ocean Dev. | Italcantieri | 1 400 | 29 710 | S | 23 | 70 | CML |
| (4254) | Bahamas Ocean Dev. | Italcantieri | 1 400 | 29 710 | S | 23 | 71 | CML |
| (4255) | Bahamas Ocean Dev. | Italcantieri | 1 400 | 29 710 | S | 23 | 71 | CML |

* *Comprising newly-built ocean going cellular and Ro-Ro vessels only*

| Name or (yard no.) | Owner | Builder | Capacity 20ft ISO | tons d.w. | Engine Speed M / S | Motorship Steamship | In service | Operator |
|---|---|---|---|---|---|---|---|---|
| GOLDEN GATE BRIDGE | K Line | Kawasaki | 716 | 15 926 | M | 22½ | 68 | JAPAN SIX |
| AUSTRALIAN SEAROADER | K Line | Kawasaki | 560* | 11 400 | M | 21 | 69 | SEAROAD |
| MANCHESTER CHALLENGE | Manchester Liners | Swan Hunter | 500 | 12 158 | M | 19½ | 68 | ML |
| MANCHESTER CONCORDE | Manchester Liners | Swan Hunter | 500 | 12 124 | M | 19½ | 69 | ML |
| MANCHESTER COURAGE | Manchester Liners | Swan Hunter | 500 | 12 158 | M | 19½ | 69 | ML |
| (1315) | Nile S.S. | Swan Hunter | 500 | 12 150 | M | 19½ | 70 | ML |
| HAWAIIAN ENTERPRISE | Matson Navigation | Bethlehem Steel | 1 200A | 26 000 | S | 23 | 70 | MATSON |
| HAWAIIAN PROGRESS | Matson Navigation | Bethlehem Steel | 1 200A | 26 000 | S | 23 | 70 | MATSON |
| (957) | Matson Navigation | Bremer Vulkan | 1 200A | 25 300 | S | 23 | 70 | MATSON |
| (958) | Matson Navigation | Bremer Vulkan | 1 200A | 25 300 | S | 23 | 70 | MATSON |
| (256) | Messageries Maritimes | La Ciotat | 1 223 | 26 400 | S | 22½ | 70 | ACS |
| (257) | Messageries Maritimes | La Ciotat | 1 223 | 26 400 | S | 22½ | 71 | ACS |
| AMERICA MARU | Mitsui-OSK Lines | Mitsubishi | 716 | 15 440 | M | 22½ | 68 | JAPAN SIX |
| AUSTRALIA MARU | Mitsui-OSK Lines | Mitsui | 1 016 | 23 312 | M | 23½ | 70 | AJCL |
| — | Mitsui-OSK Lines | Mitsui | 1 700 | 35 000 | M | 26 | 71 | MITSUI-OSK/NY |
| — | Mitsui-OSK Lines | Mitsubishi | 1 700 | 35 000 | M | 26 | 71 | MITSUI-OSK/NY |
| MORMACSEA | Moore-McCormack | Ingalls | 825 | 16 830 | S | 24 | 69 | MORMAC |
| MORMACSKY | Moore-McCormack | Ingalls | 825 | 16 830 | S | 24 | 69 | MORMAC |
| MORMACSTAR | Moore-McCormack | Ingalls | 825 | 16 830 | S | 24 | 70 | MORMAC |
| MORMACSUN | Moore-McCormack | Ingalls | 825 | 16 830 | S | 24 | 70 | MORMAC |
| — | Nederlandse Scheep. Unie | Bremer Vulkan | 2 000 | 40 000 | S | 26 | 73 | N.S.U. |
| — | Nederlandse Scheep. Unie | Bremer Vulkan | 2 000 | 40 000 | S | 26 | 73 | N.S.U. |
| WESER EXPRESS | Norddeutscher Lloyd | Bremer Vulkan | 732 | 11 350 | M | 20 | 68 | HAPAG-LLOYD |
| ALSTER EXPRESS | Norddeutscher Lloyd | Bremer Vulkan | 732 | 11 350 | M | 20 | 69 | HAPAG-LLOYD |
| (956) | Norddeutscher Lloyd | Bremer Vulkan | 1 300 | 30 000 | S | 21½ | 70 | ACS |
| HAKONE MARU | Nippon Yusen Kaisha | Mitsubishi | 752 | 16 306 | M | 22½ | 68 | NYK |
| HARUNA MARU | N.Y.K. & Showa Kaiun | Mitsubishi | 752 | 16 290 | M | 22½ | 68 | NYK/SHOWA |
| HAKOSAKI MARU | Nippon Yusen Kaisha | Mitsubishi | 1 010 | 19 914 | M | 23 | 69 | NYK |
| TOHGO MARU | N.Y.K., Mitsui-OSK & YS Line | Hitachi | 1 170 | 19 500 | M | 23 | 70 | AJCL |
| (1019) | N.Y.K. & Showa Kaiun | Mitsubishi | 750 | 17 000 | M | 22½ | 70 | NYK/SHOWA |
| — | Nippon Yusen Kaisha | Mitsubishi | 1 700 | 35 000 | M | 26 | 71 | MITSUI-OSK/NYI |
| — | Nippon Yusen Kaisha | Mitsubishi | 1 700 | 35 000 | M | 26 | 72 | MITSUI-OSK/NYI |
| — | Nippon Yusen Kaisha | Nippon Kokan | 1 700 | 35 000 | M | 26 | 71 | MITSUI-OSK/NYI |
| ENCOUNTER BAY | British & Common-wealth | H.D.W. | 1 300 | 30 000 | S | 21½ | 69 | ACS |
| FLINDERS BAY | Ocean S.S. | H.D.W. | 1 300 | 30 000 | S | 21½ | 69 | ACS |
| BOTANY BAY | Furness Withy | H.D.W. | 1 300 | 30 000 | S | 21½ | 69 | ACS |
| MORETON BAY | P & O | Blohm+Voss | 1 300 | 30 000 | S | 21½ | 69 | ACS |
| DISCOVERY BAY | P & O | H.D.W. | 1 300 | 30 000 | S | 21½ | 69 | ACS |
| JERVIS BAY | Furness Withy | U.C.S. | 1 300 | 30 000 | S | 21½ | 70 | ACS |
| (972) | OCL member | Bremer Vulkan | 1 040 | 22 000 | S | 22 | 71 | [redacted] PACE |
| (987) | OCL member | Mitsubishi | 976 | 22 000 | M | 23 | 70 | AJCL |
| (869) | OCL member | Mitsui | 972 | 22 000 | M | 23 | 70 | AJCL |

| Name or (yard no.) | Owner | Builder | Capacity: 20ft ISO | Capacity: tons d.w. | Engine: M = Motorship S = Steamship | Speed | In service | Operator |
|---|---|---|---|---|---|---|---|---|
| (24) | OCL member | H.D.W. | 1 800 | 37 500 | S | 26 | 71 | OCL |
| (25) | OCL member | H.D.W. | 1 800 | 37 500 | S | 26 | 71 | OCL |
| (26) | OCL member | H.D.W. | 1 800 | 37 500 | S | 26 | 72 | OCL |
| (27) | OCL member | H.D.W. | 1 800 | 37 500 | S | 26 | 72 | OCL |
| (40) | OCL member | Swan Hunter | 1 420 | 30 000 | S | 23 | 73 | OCL |
| (42) | OCL member | Swan Hunter | 1 420 | 30 000 | S | 23 | 74 | OCL |
| — | East Asiatic | B & W | 1 700 | 35 000 | M | 26 | 72 | SCANSERVICE |
| — | East Asiatic | B & W | 1 700 | 35 000 | M | 26 | 72 | SCANSERVICE |
| (234) | Broström | Götaverken Gp. | 1 700 | 35 000 | M | 26 | 72 | SCANSERVICE |
| | Wilh. Wilhelmsen | Mitsui | 1 700 | 35 000 | M | 26 | 72 | SCANSERVICE |
| (662) | Scanaustral | Eriksberg M.V. | 1 400* | 30 000 | M | 22¾ | 72 | SCANAUSTRAL |
| (663) | Scanaustral | Eriksberg M.V. | 1 400* | 30 000 | M | 22¾ | 73 | SCANAUSTRAL |
| (664) | Scanaustral | Eriksberg M.V. | 1 400* | 30 000 | M | 22¾ | 73 | SCANAUSTRAL |
| (281) | Scanaustral | France-Gironde | 1 400* | 30 000 | M | 22¾ | 72 | SCANAUSTRAL |
| (282) | Scanaustral | France-Gironde | 1 400* | 30 000 | M | 22¾ | 72 | SCANAUSTRAL |
| (1382) | Sea-Land | AG Weser | 1 086B | 32 000 | S | 33 | 72 | SEA-LAND |
| (1383) | Sea-Land | AG Weser | 1 086B | 32 000 | S | 33 | 73 | SEA-LAND |
| (1384) | Sea-Land | AG Weser | 1 086B | 32 000 | S | 33 | 73 | SEA-LAND |
| (330) | Sea-Land | Rotterdam Dockyard | 1 086B | 32 000 | S | 33 | 72 | SEA-LAND |
| (331) | Sea-Land | Rotterdam Dockyard | 1 086B | 32 000 | S | 33 | 73 | SEA-LAND |
| (332) | Sea-Land | Rotterdam Dockyard | 1 086B | 32 000 | S | 33 | 74 | SEA-LAND |
| (430) | Sea-Land | Rheinstahl N/W | 1 086B | 32 000 | S | 33 | 73 | SEA-LAND |
| (431) | Sea-Land | Rheinstahl N/W | 1 086B | 32 000 | S | 33 | 73 | SEA-LAND |
| (419) | Seatrain | Rheinstahl N/W | 1 600 | 32 000 | G‡ | 24½ | 70 | SEATRAIN |
| (420) | Seatrain | Rheinstahl N/W | 1 600 | 32 000 | G‡ | 24½ | 70 | SEATRAIN |
| (428) | Seatrain | Rheinstahl N/W | 1 600 | 32 000 | G‡ | 24½ | 71 | SEATRAIN |
| (429) | Seatrain | Rheinstahl N/W | 1 600 | 32 000 | G‡ | 24½ | 71 | SEATRAIN |
| (645) | Transatlantic S.S. | Eriksberg M.V. | 1 200* | 24 000 | M | 22 | 70 | PAD LINE |
| (646) | Transatlantic S.S. | Eriksberg M.V. | 1 200* | 24 000 | M | 22 | 70 | PAD LINE |
| (1391-4) (four ships) | C.Y. Tung | La Méditerranée | 830 | 18 750 | M | 22 | 71 | OOL |
| AMERICAN LANCER | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 22 225 | S | 21½ | 68 | USL |
| AMERICAN LEGION | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 22 138 | S | 21½ | 68 | USL |
| AMERICAN LIBERTY | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 21 275 | S | 21½ | 68 | USL |
| AMERICAN LYNX | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 21 665 | S | 21½ | 68 | USL |
| AMERICAN LARK | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 20 574 | S | 21½ | 69 | USL |
| AMERICAN ASTRONAUT | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 22 000 | S | 21½ | 69 | USL |
| (654) | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 22 000 | S | 21½ | 71 | USL |
| (655) | U.S. Lines | Sun Sbdg. & D.D. | 1 210 | 22 000 | S | 21½ | 72 | USL |
| (870) | United Neth. Nav. | Van der Giessen—De Noord | 1 300 | 30 000 | S | 21½ | 70 | ACS |
| KASHU MARU | Yamashita-Shinnihon | Hitachi Zosen | 732 | 15 014 | M | 22½ | 68 | JAPAN SIX |

* = Ro-Ro/containership with additional space for vehicles

† = Cellular ,, ,, ,, ,, ,, general cargo

‡ = Gas turbine main propulsion machinery

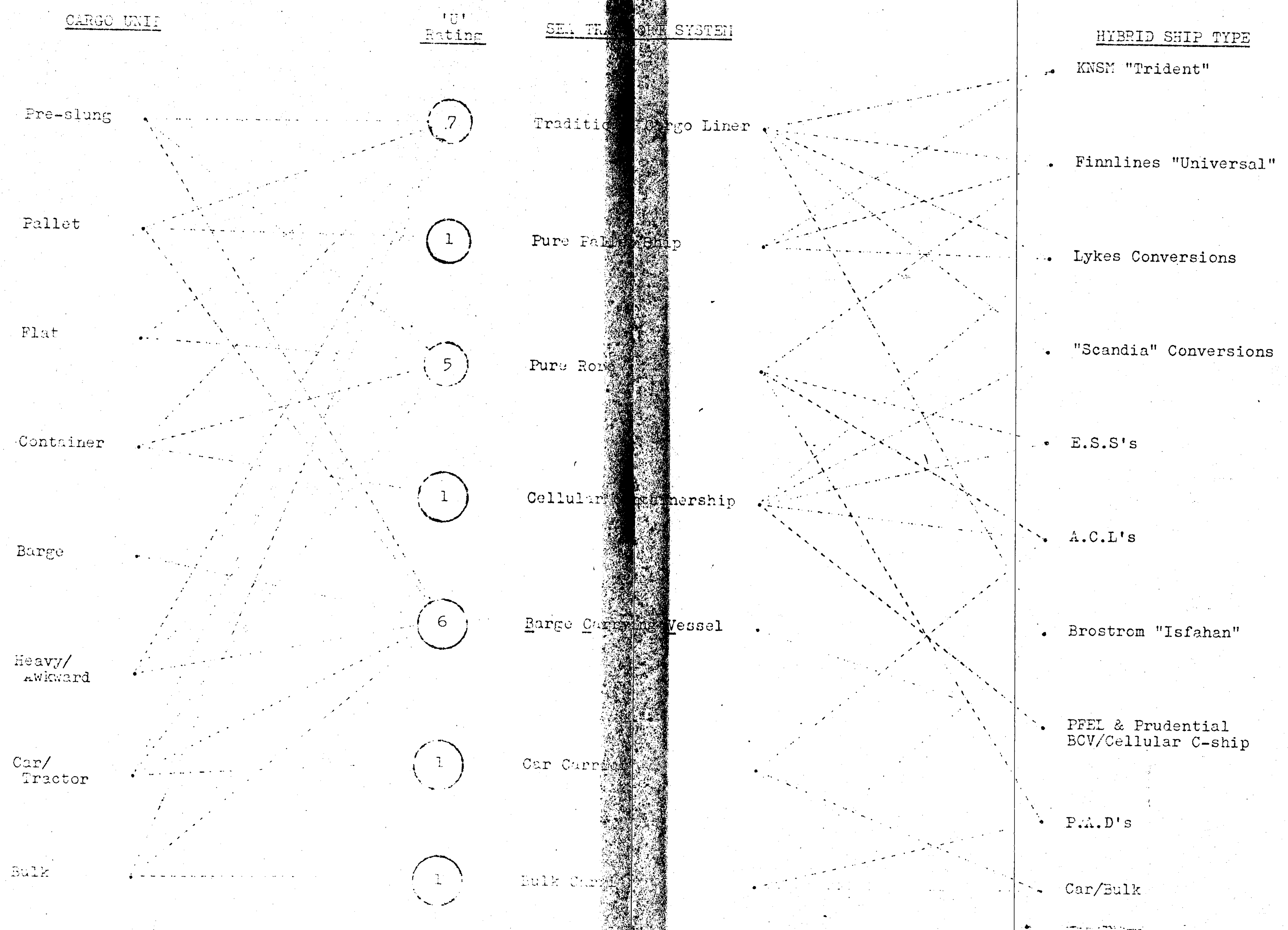
A = 24ft × 8ft × 8ft 6in containers

B = 27ft × 8ft × 8ft 6in &
35ft × 8ft × 8ft 6in container

| Name or (yard no.) | Owner | Builder | Capacity 20ft ISO | tons d.w. | Engine M Motorship S Steamship | Speed | In service | Operator |
|---|---|---|---|---|---|---|---|---|
| (975) | Blue Star Line | Bremer Vulkan | 800 | 18 300 | M | 21½ | 71 | BLUE STAR |
| (976) | Blue Star Line | Bremer Vulkan | 800 | 18 300 | M | 21½ | 71 | BLUE STAR |
| (977) | Blue Star Line | Bremer Vulkan | 800 | 18 300 | M | 21½ | 72 | BLUE STAR |
| (43) | Ben Line | H.D.W. | 1 800 | 35 000 | S | 26 | 72 | BEN LINE |
| (44) | Ben Line | H.D.W. | 1 800 | 35 000 | S | 26 | 72 | BEN LINE |
| (1343) | CP Ships | Cammell Laird | 700 | 14 000 | M | 20 | 70 | CP SHIPS |
| (1344) | CP Ships | Cammell Laird | 700 | 14 000 | M | 20 | 70 | CP SHIPS |
| (1345) | CP Ships | Cammell Laird | 700 | 14 000 | M | 20 | 70 | CP SHIPS |
| (14) | Tynedale Shpg. | Swan Hunter | 1 500 | 31 000 | M | 23 | 70 | DART |
| (15) | Bristol City Line | Swan Hunter | 1 500 | 31 000 | M | 23 | 70 | DART |
| (857) | Belgian Line | Cockerill | 1 500 | 31 000 | M | 23 | 70 | DART |
| (194) | East Asiatic | Nakskov | 820 | 15 750 | M | 22½ | 71 | E.A.C. |
| (195) | East Asiatic | Nakskov | 820 | 15 750 | M | 22½ | 72 | E.A.C. |
| (1180) | Farrell | Ingalls | 978† | 19 750 | S | 23 | 70 | FARRELL |
| (1181) | Farrell | Ingalls | 978† | 19 750 | S | 23 | 71 | FARRELL |
| (1182) | Farrell | Ingalls | 978† | 19 750 | S | 23 | 71 | FARRELL |
| (1183) | Farrell | Ingalls | 978† | 19 750 | S | 23 | 71 | FARRELL |
| (421) | Amer-Tupakka | Rheinstahl N.W. | 560† | 14 000 | M | 20 | 70 | FINN GROUP |
| (422) | Jussi Ketola | Rheinstahl N.W. | 560† | 14 000 | M | 20 | 71 | FINN GROUP |
| (423) | Enso Gutzeit | Rheinstahl N.W. | 560† | 14 000 | M | 20 | 71 | FINN GROUP |
| (1170) | Flinders Shpg. | Kawasaki | 560* | 11 400 | M | 21 | 70 | SEAROAD |
| (15) | Hamburg-Süd | H.D.W. | 1 180 | 25 000 | S | 22 | 70 | COLUMBUS |
| (16) | Hamburg-Süd | H.D.W. | 1 180 | 25 000 | S | 22 | 71 | COLUMBUS |
| (17) | Hamburg-Süd | H.D.W. | 1 180 | 25 000 | S | 22 | 71 | COLUMBUS |
| GOLDENFELS | DDG Hansa | Lübecker F/W | 475 | 14 000 | M | 20 | 70 | HANSA |
| GUTENFELS | DDG Hansa | Lübecker F/W | 475 | 14 000 | M | 20 | 70 | HANSA |
| ELBE EXPRESS | HAPAG | Blohm+Voss | 732 | 11 350 | M | 20 | 68 | HAPAG-LLOYD |
| ALSTER EXPRESS | HAPAG | Blohm+Voss | 732 | 11 350 | M | 20 | 69 | HAPAG-LLOYD |
| (872) | HAPAG | Blohm+Voss | 1 300 | 30 000 | S | 21½ | 70 | ACS |
| (877) | HAPAG | Blohm+Voss | 1 800 | 80 000 | S | 26 | 72 | HAPAG |
| (878) | HAPAG | Blohm+Voss | 1 800 | 80 000 | S | 26 | 72 | HAPAG |
| (875) | H.C. Isbrandtsen | Van der Giessen—De Noord | 400 | 8 000 | M | 22 | 71 | — |
| (876) | H.C. Isbrandtsen | Van der Giessen—De Noord | 400 | 8 000 | M | 22 | 71 | — |
| (274) | H.C. Isbrandtsen | Schpswf. De Hoop, Lobith | 400 | 8 000 | M | 22 | 71 | — |
| JAPAN ACE | Japan Line | I.H.I. | 730 | 15 819 | M | 22½ | 68 | JAPAN SIX |
| — | Japan Line & K Line | I.H.I. | 736 | 18 900 | M | 22½ | 70 | JAPAN SIX |
| AXEL JOHNSON | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 69 | JOHNSON LINE |
| ANNIE JOHNSON | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 69 | JOHNSON LINE |
| MARGARET JOHNSON | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 70 | JOHNSON LINE |
| (1172) | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 70 | JOHNSON LINE |
| (1173) | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 71 | JOHNSON LINE |
| (1174) | Johnson Line | Wärtsilä | 548† | 14 700 | M | 23 | 72 | JOHNSON LINE |

Appendix A

Relationship between Cargo Units, Sea Transport Systems, Ship Types

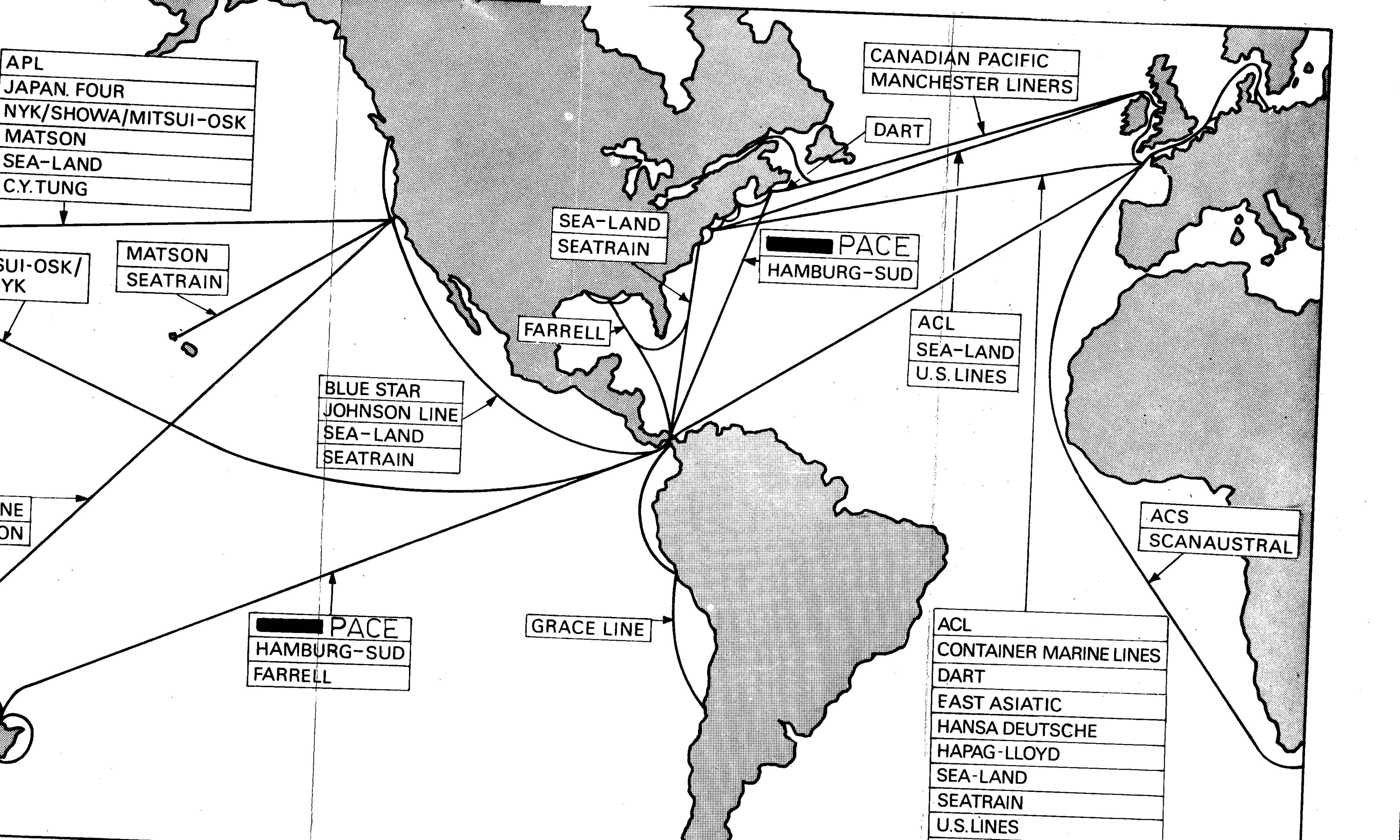


# INTERNATIONAL CONTAINER ROUTES AND OPERATORS

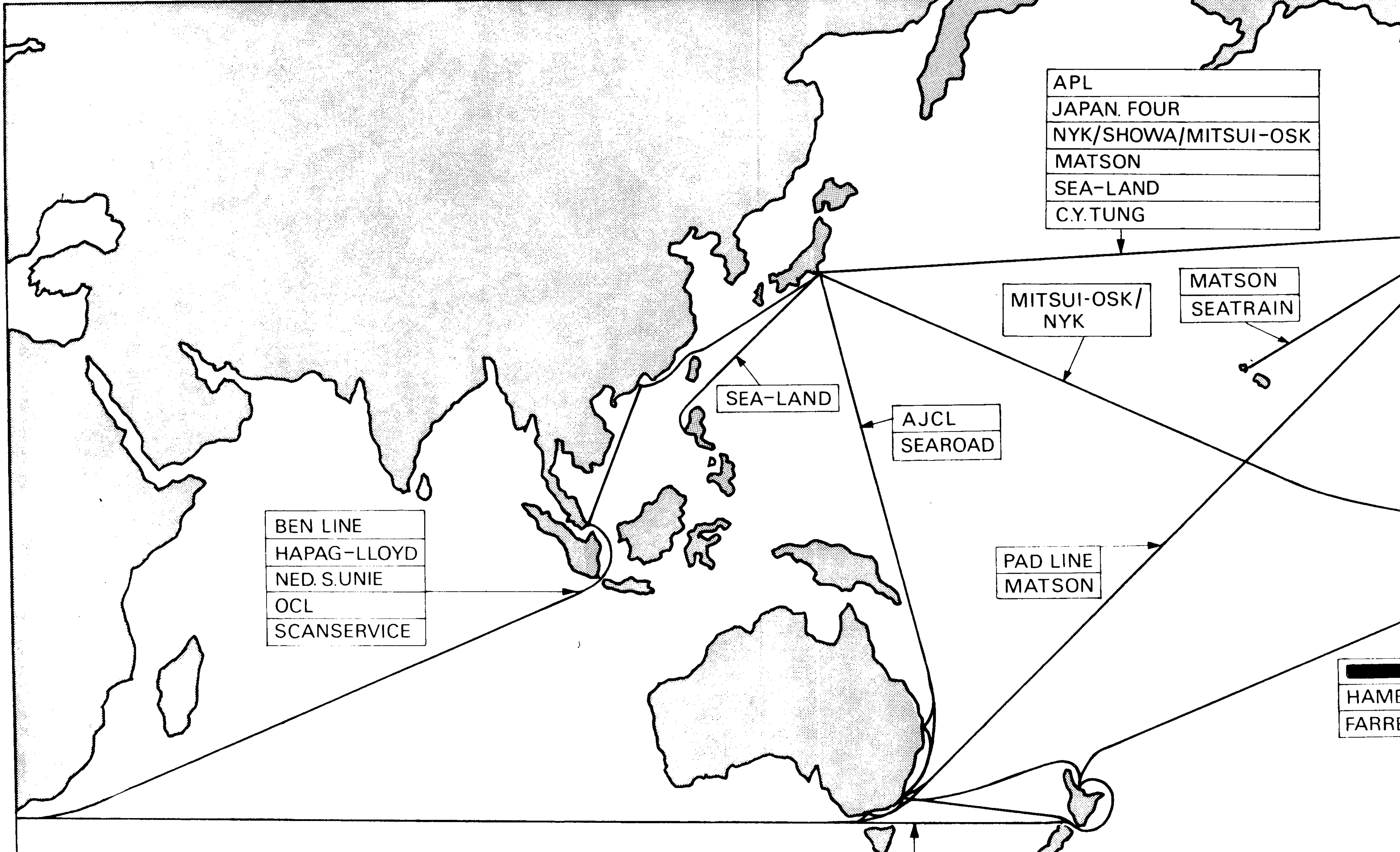
The table indicates the capacity of purpose-built ocean-going containerships by operator and by routes, as shown on the map

| Route & operators | No. of ships | No. of containers |
|---|---|---|
| **Europe/U.S. East Coast** | | |
| Atlantic Container Line | 10 | 8 816 |
| Container Marine Lines | 3 | 2 784 |
| Dart Containerline | 3 | 4 500 |
| East Asiatic Co. | 2 | 1 640 |
| Hansa-Deutsche | 2 | 950 |
| Hapag-Lloyd | 4 | 2 928 |
| Moore-McCormack | 4 | 3 300 |
| Sea-Land Service | 3 | 3 258B |
| Seatrain Lines | 2 | 2 400 |
| United States Lines | 8 | 9 690 |
| **Total** | **41** | **40 266** |
| **Europe/Canada East Coast** | | |
| CP Ships | 3 | 2 100 |
| Dart Containerline | 3 | 4 500 |
| **Total** | **6** | **6 600** |
| **U.K./Canada East Coast** | | |
| Manchester Liners | 4 | 2 000 |
| **Europe/U.S. Pacific Coast** | | |
| Blue Star Line | 3 | 2 400 |
| Johnson Line | 6 | 3 288 |
| **Total** | **9** | **5 688** |
| **Europe/Australia** | | |
| Australia Container Service | 13 | 16 900 |
| Scanaustral | 5 | 7 000 |
| **Total** | **18** | **23 900** |
| **U.K./New Zealand** | | |
| OCL/ACT | 4 | 5 680 |
| **Europe/Far East** | | |
| Ben Line | 2 | 3 600 |
| Hapag | 2 | 3 600 |
| Ned. S. Unie | 2 | 4 000 |
| OCL | 4 | 7 200 |
| Scanservice | 4 | 6 800 |
| **Total** | **14** | **25 200** |
| **Japan/Europe** | | |
| Mitsui-OSK/NYK | 5 | 8 500 |
| **Japan/Australia** | | |
| A.J.C.L. | 5 | 5 144 |
| Eastern Searoad Service | 4 | 2 240 |
| **Total** | **9** | **7 384** |
| **Japan/N. America Pacific Coast** | | |
| Japan Four Service | 4 | 2 914 |
| NYK/Showa/Mitsui-OSK | 4 | 2 970 |
| **Total** | **8** | **5 884** |
| **U.S. Pacific Coast/Far East** | | |
| American President Lines | 3 | 2 934 |
| Matson Navigation | 2 | 2 400A |
| Sea-Land Service | 5 | 5 430B |
| **Total** | **10** | **10 764** |
| **U.S. Pacific Coast/Australia** | | |
| Matson Navigation | 2 | 2 400A |
| PAD Line | 3 | 3 600 |
| **Total** | **5** | **6 000** |
| **U.S. Gulf Coast/Australia & N.Z.** | | |
| Farrell Lines | 4 | 3 912 |
| **Australia & N.Z./U.S. & Canada East Coast** | | |
| [redacted] PACE LINE | 4 | 4 160 |
| Hamburg-Süd | 3 | 3 540 |
| **Total** | **7** | **7 700** |
| **U.S. Gulf Coast/S. America Pacific Coast** | | |
| Grace Line | 4 | 700 |

All containers listed are of 20ft ISO design except
A = 24ft × 8ft × 8ft 6in
B = 27ft × 8ft × 8ft 6in and 35ft × 8ft × 8ft 6in



APL
JAPAN. FOUR
NYK/SHOWA/MITSUI-OSK
MATSON
SEA-LAND
C.Y. TUNG
MATSON
SEATRAIN
BLUE STAR
JOHNSON LINE
SEA-LAND
SEATRAIN
[redacted] PACE
HAMBURG-SUD
FARRELL
FARRELL
SEA-LAND
SEATRAIN
[redacted] PACE
HAMBURG-SUD
GRACE LINE
CANADIAN PACIFIC
MANCHESTER LINERS
DART
ACL
SEA-LAND
U.S. LINES
ACS
SCANAUSTRAL
ACL
CONTAINER MARINE LINES
DART
EAST ASIATIC
HANSA DEUTSCHE
HAPAG-LLOYD
SEA-LAND
SEATRAIN
U.S. LINES




CONTAINER SERVICES & ROUTES

WRITTEN DISCUSSION

AND AUTHOR'S REPLY

# "SEA TRANSPORT IN THE SEVENTIES"

BY

Mr. G. GRIFFITHS.

PRESENTED BEFORE

## THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

AUSTRALIAN BRANCH

1971.

# THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

## (AUSTRALIAN BRANCH)

WRITTEN DISCUSSIONS:

Paper by: Mr. G. Griffiths.
Title: Sea Transport in the Seventies.
Date: 31st March, 1971.

MR. K.W. FISHER.

Mr. Griffiths' paper is highly commendable from several points of view. The grouping of pertinent statistics on shipping, while not overwhelming the reader with too many, results in a very clear picture of Australia's part in the shipping world. - far larger than previously suspected, both in terms of quantity and innovative quality.

Equally important is the observation that certain financial aspects of the organisation of the shipping trade can have greater impact on the competitiveness of the trade than can aspects such as operating costs. The author undoubtedly speaks from experience. It appears that there is much to be learned yet of these matters. As an example, consider the following;

In overseas trade, the real competitors are not so much shipping lines as governments and their financial administration. Generally, such overseers of the public wealth are hesitant to liberalise the forms of assistance listed by the author in the section, "General Comments". Once the matter of "showing the flag" is attended to, further dispersement of public monies is seen only as a drain on the budget. Surely, today's techniques of long-term studies can be used to ascertain exactly how big a drain is caused by such assistance. Indeed, the net effect of financial assistance might be to increase the competitiveness of the flag lines to such an extent that total trade carried by the flag lines increases, bringing with it greater tax revenues. Obviously there will be a point beyond which greater financial assistance will not be equally rewarded. That point should be determined, not neglected.

The author does make one point which requires careful consideration. The tenth paragraph of the section on "Bulk Carriers and Tankers" (top of page 3) appears to be a short-sighted approach. It is believed that the author is saying that the economies of scale for dry bulk carriers are not a necessary consideration as long as the market will bear greater freight rates. If that is a correct interpretation of that paragraph, perhaps the author would like to explain the reasoning behind it. Otherwise, he might re-interpret it for the reader.

Lastly, the presentation of this paper from a recent historical perspective, starting with the 1950's, gives clear indication that in world shipping circles, Australia has nothing to be ashamed of, and has much reason for pride. That status has been achieved by resourcefulness and innovation, which must be continually renewed to maintain Australia's position in world shipping. The author deserves high commendation for bringing that point to the forefront.

REPLY

Thank you Mr. Fisher, I think you are endorsing our thinking. If we had these assistances, these other financial assistances, our competitive position against other lines of ships overseas would be better than it is now and I would like to think, with you, that we could with full involvement, bring back more into the country in the forms of planning for defence, pioneer and economic return than the country would have to pay in regard to assisting these types of ships.

I think there has been a misunderstanding in regard to economy of scale and we say that unless you have got a guarantee freight return don't go on with it. What I am trying to state here is that it has always been generally understood that the cost of freight for bulk cargoes over the last ten years or so has been fairly stable. In spite of inflationary trends it has been fairly static and the reason for this is the economy of scale where ships have been getting bigger and bigger and the economy of scale has been equal to the increase in costs.

All I can say is that we have now reached a position where there will have to be an increase soon in freight rates in bulk cargoes in areas which have not seen increases for such a long time.

The economy of scale will still be there, it will not increase so much as it would a long time ago.

QUESTION by MR. E.S. CLARKE.

1. In the recent containerisation explosion there has been much stressing that the sea link is but one in the transport chain from raw material producer to consumer (as Sir W. Gunn said recently, "from sheep's back to wearer's back").

The terminal interface between land and sea has proved a great bottle-neck in the cellular container concept. For approximately similar ship deadweights either coastal or overseas, this does not appear to have been the case with R.O./R.O. or Hybrid type ships.

Is this impression correct and, if so, could Mr. Griffiths comment on why this is so?

In the figure relating cargo to ship types the last line shows that a bulk carrier can carry only bulk cargoes. I remind him of, and invite him to comment on, an exception. "HMAS Jeparit" (Ex. "M.V. Jeparit") designed as a bulk carrier, with cranes, is serving the Viet Nam area very efficiently as a general cargo ship.

REPLY

The question regarding the relative efficiency of say some of the ships operating against the vehicle deck operation has, to some extent, to be referred again by me back into my paper, the operation which has taken place on the Australian coast with vehicle deck ships in the domestic trade, is not anywhere like the kind of operation which has taken place on the Eastern Searoad Service. The Eastern Searoad Service a completely different type of ship which has been designed and engineered round a standard box. We knew that the vehicle deck ship, our particular design and development had to go into the overseas trade and compete against cellular container ships. In the A.N.L. we wanted to make sure that this rather revolutionary change into this modular centre would be buffered to some extent by putting as much under our own control as we could, so we did take this step to produce a vehicle deck concept which would work with our labour, our permanent labour, in our terminals, under conditions and circumstances that we understood. Now we did not run into the similar problems that the cellular type ship people did run into. They started off with a completely new system, it was completely revolutionary and a lot of hard planning had to go on at that time. We know that most of the difficulties that have been experienced in regard to the cellular container ship operation have been in the terminal areas, but they have been plagued with bad luck, bad industrial relationships and, once you get men down to few in number, they can put a stranglehold on to this kind of capital intensive operation, and you need the through-put - you must get this through-put. It is mainly on account of this industrial trouble that they have had in Australia which has been very, very bad in regard to the terminal operations for cellular container ships and also equally bad problems in London where the Tilbury services were not even afforded these people and they had to ship their material across to the continent. It is really because of this that there have been problems in settling it down. I do not think it fair for a comparison of what has been happening with the cellular container ship with regard to the turn around of cargo with what has been happening to us in the Eastern Shiproad Services. There was a gross underestimation on the part of the cellular container people on the inbalance of cargo - less cargo coming into Sydney than goes out, and the reverse applies to Melbourne, which necessitates the empty containers being shipped to suit this in-balance. But it is wrong, I think, to put this in if you compare a vehicle deck ship on the one hand, with the cellular container ship on the other. One thing I can say, we can prove conclusively that the concept the A.N.L. have at the moment in the Eastern Searoad Services is faster than any cellular container ship service can be. The basis for this is that using exactly the same equipment you have got on the upper deck, you can go two high, three high, indeed go five high, if the ship is big enough. We have proven the fork lift operation in vehicle deck and have developed a technique where it is sure and fast, you could not better this, provided you have the standard unit, the standard of cost and you use the same engineering devices as we put into that ship for a quick locking of the unit in place.

Your final question, the "Jeparit", a bulk carrier to us, as I have set it out is a gearless bulk carrier running between properly set up loading facilities and properly established discharge point. If a bulk carrier has its own gear, in our book it is a general cargo ship. I mean it is cheating a little. I'm glad she is doing a good job but we will be glad to have her back with the A.N.L. again soon.

QUESTION by MR. A. TAIT.

AUSTRALIAN ENTERPRIZE

1. Are there any stability problems unloading containers by crane simultaneously with fork lift cargo from lower decks?.

2. SHIPS MENTIONED AT END OF PAPER.
Why 22 knots? Regardless of size and route or service this appears to be generally the average except for Sea-Land's new ships, and special route for which "Darwin Trader" was designed.

REPLY

In the vehicle deck ship design we had four ports of call in Australia, twice in Sydney, once in Brisbane and Melbourne, and four ports of call in Japan. We just could not see how we could reduce the instance of double handling of cargo, such as getting one lot of cargo out without moving cargo which was for the next port; there were problems which we had to work on in the A.N.L. for weeks - we had six or seven people with thousands of little wooden blocks, the blocks were different colours representing one port in and out, etc. and we were sending these ships round and round the board room table in A.N.L. for six weeks.

We realised that the ship had to be capable of having, for instance, full load of containers on the upper deck and the lower decks empty. So the ship was built to be capable of holding a draft of 26 ft. in an unloaded condition, and keep that draft to 26ft. in a loaded condition, and with the big double bottom tanks available in this type of ship this was possible for the designers to achieve.

On the question of speed the problem was to provide a 28-day schedule, again using the little wooden blocks we knew the time required in port - the time the ship would be at sea, etc. and we came up with the answer that we must have a ship capable of a service speed of $21\frac{1}{2}$ knots. We put in this ship a capability of something about 25 knots, on trials she did 26.25 knots. But if the ship should arrive before time she would cause as much disruption to us as if she arrived late. Then a speed of 33 knots, although very handy if you are waiting for the cargo, is not much use to this 4 ship schedule.

QUESTION by MR. R.J. HALLETT.

What order of improvement would be required by a new technology to displace or significantly interfere with presently established unit-cargo systems, particularly with regard to your reference to the 70's as a period of development rather than innovation?

REPLY.

Well, in the period of consolidation I referred to, I was thinking of the type of problems which have been experienced being cleared, I'm thinking of the settling down of the industrial front of the waterside labour. Nobody will be too keen to say that now we have settled that lot, lets start again, and we must consider it phasing into the life expectancy of the new vessels.

I must say that if the development we see in the next 10 years is anything as dramatic as that of the last 10 years, it could be anybodys guess. But I do not really think that, except for some developments connected with defence, I do not think that other than introduction of nuclear propulsion, there will be anything too dramatic.

I would like to think of the introduction of the air-ship and the helicopter are the ones which have the most promise.

The meeting then developed into general discussion on questions other than written direct to the Author.

The President then called on Captain J.F. Bell to move a vote of thanks on behalf of all Members and Guests to Mr. Griffiths for his excellent paper.

CANBERRA, 12th May 1971.

Capt. E.B. Good questioned the justification for increasing speeds in container ships;-

REPLY

It is true that the earlier cellular container ships - 750 to 800 containers - the speeds were about 20 knots and this was considered a fairly high speed. But the bigger ships projected by overseas interests are certainly going to have very much increased speeds - sealine 33 knots, and the latest projection for one company, 36

REPLY to CAPT. E.B. GOOD, Continued

36 knots and it seems rather a fantastic speed for a container ship to do. I think it is mainly due to the overall optimisation studies that have to be made ... any container ship operator today has to make a careful study of all that is involved - he has a schedule to keep and if his ship gets behind schedule he must have a speed reserved to get back on schedule, bearing in mind that all that capital equipment is sitting there waiting for him, eating its head off and, in this capital intensive system, you have only got to have one ship drop out and the whole system drops back. You have seen this in the recent problem we have had, the European service, and it is necessary to have a considerable reserve of speed - furthermore I believe one of the influences towards these high speeds is that these are very big ships and they have a capability of maintaining high speeds without worrying about sea-keeping conditions, etc., also they, themselves, are carrying a considerable amount of equipment, quite a lot of boxes, and all this is dead time and the fact that they can get it from A to B very quickly may justify the economic picture. It is things of this nature which I think have led to this increased speed.

QUESTION by MR. R.E. ELLIS

I was very interested in your statement that the lesser ports, which in the past have enjoyed sailings direct to Europe and other ports of the world, will fall out in the future, but I do not understand, after I have witnessed the large volume of barge traffic in American ports, why we should depend on trains and trucks to take the cargo to the main ports for shipping overseas. Could you enlighten me on this?

REPLY

This is a very highly controversial subject because it is pretty rough on some of the original sea ports, if they had some identification in overseas trade and this has been their very life blood, to suddenly see super ships running between super ports and they are missing out. The feeder service makes it possible for the people who do transport their goods, the shippers themselves, do not lose out..but certainly the identification of the port as a whole does. We in the A.N.L. do not quite know what the answer is going to be in, say, the North Queensland service. Do we provide feeder services and, if we do, one to compete against rail? And then you have the problem between road and rail, with the Government sponsorship of rail, and then you have the problem of the regional port people themselves. It is quite a "thorny" problem which involves quite a lot of people and it has social implications, but, if you are to have a tug and barge system, I do not think that the economics of this system would come out favourably against an already established vehicle deck system. Furthermore, you still have the fair or unfair competition; generally unfair in regard to development problems - I really do not know the answer to this question. What of the Scandinavian operation - here you have something being sold on the grounds of complete flexibility which is being pushed as a super service against something which is being exhibited as inflexible. It is a very interesting area.

WRITTEN QUESTION by CAPT. W.J. ROURKE, RAN.

I was particularly interested to hear Mr. Griffiths speak of the total transport problem of getting a product from its source to its destination. I don't think I have ever seen the broad approach to this put more clearly than in the comments of Mr. Garrick Agnew to an interviewer of the Financial Times last week. He said there it was not likely to be rewarding to send a geologist out on a general search for gypsum, but rather to search for gypsum to export to particular markets and that would have port access, and be profitable to pick up, load and transport. Mr. Agnew started his business career as a shipping broker, and it seems his overall view of the problem has stood him in good stead. I think we have to see more of this total system approach, and that designers of commercial transport systems, and of military transport systems, have to look at the overall economics of the problem and see whether investment is best put into ports, or handling facilities, or ship size, or ship speed or some other parameter. We had a paper presented to this Institution recently by Mr. Fisher where the design of a bulk carrier fleet was approached in this way, and I think this is a course more should follow.

I purposely grouped commercial and military transport systems in my comment because I believe that with similar considerations of speed in handling, and speed in passage, that they are growing together more, and more. Container ships and container terminals are playing a major part in the logistic support of the war in Vietnam. Vehicle deck ships and LASH ships are utilising concepts first tried in landing ships, assault ships, and similar military vessels. In fact the pace of commercial development is such that I have some fears that naval vessels, particularly naval support ships, wont be able to keep pace with their commercial counterparts. I mean that

WRITTEN QUESTION by CAPT. W.J. ROURKE, Continued.

literally, and there is some danger that we build ships of 16 - 18 knots for military support while the commercial economists realise that higher speeds pay increased dividends.

I would like the Author to comment on the way his company goes about the ship selection process, or solution of the transport system optimisation problem, and to elaborate his views on the trends of speed, particularly for high value cargoes.

REPLY.

In regard to the ship optimisation study to which you referred, you can set up a bulk carrier system around the Australian coast where you assess the steel work requirement, and you may optimise with regard to the size of ship having regard to speed, etc., but it is a very theoretical study because it means scrapping the existing fleet that you have got, and you did ask how the A.N.L. would do this. We have got ships from Lake Class at 10,000 tons to Darling River Class of 50,000 tons. All we can say is that the economy of scale works, and the bigger the ship the more amount of money we make - we would be limited in Australia to the ship no bigger than the size of the Cairncross Dry Dock and if we wish to keep unions on our side in Australia we certainly do not get it by saying we will build a ship that cannot be docked in Australia, and that we will dock it in Singapore. Once in Japan I was asked to give them the principal dimensions of a ship so that it could be fed into a computer, so they could show me how quickly I could be given the maximum and minimum parameters based on classification requirement, scantlings, etc. and I gave them the principal dimensions of the Cairncross Dry Dock and that, to me, was one way of optimising from the restrictions we have got.

We have also got draft restrictions in this trade which must be considered in the Australian scene. But certainly every ship owner on the Australian Coast will say what you want is the biggest possible ship that you could use, and if we thought that an 80,000 ton ship was the optimum we would obviously go for the 100,000 ton vessel to keep it ahead. But the above consideration must be used for a practicable optimisation.

QUESTION by CAPT. J. BELL with regard to the arrangements being made to discharge the very large bulk carriers in relation to off-shore facilities.

REPLY.

It is evident from the ships that are on order that over 50% will be of ships of 100,000 tons and over, and it is a fact that there would not be more than two facilities in Europe that can handle, at this stage, the 100,000 tonner - Port Talbot being the most recent, built by the British Steel Company.

There is a lot of activity going on where large facilities are being built in Japan to handle this size vessel.

It is true to state that the loading facilities do not present a difficulty here, it is the discharge ports of Port Kembla and Newcastle - particularly Newcastle, where difficulties occur.

There is plenty of scope for developing off-shore loading facilities - artificial islands - where you could have small ships going back and forth from an artificial island some 100 to 200 miles out.

QUESTION by MR. AIR.

Could Mr. Griffiths make a short comment on what must have been experienced as problems on what must have been unconventional deck and opening structures, and if, in fact, the commercial and economical life of a ship is at all likely to be limited by practice of Hull integrity or, since he has been following so many fashions, does he think some of these are going to drop out in the near future?

REPLY.

No - we have not experienced indication that the commercial or economic life of a vessel is suffering. As far as early obsolesence is concerned it is rather soon to say which type will become more popular.

As far as Australia is concerned we have gone vehicle deck. We would be about the only country in the world which operates almost exclusively as vehicle deck ships.

While it is understandable with the marriage between road and rail, which is understandable in Tasmania, but not so readily understandable around the mainland ports. While I have been associated with this, from a project sense, I really cannot state why this should be so.

The Chairman then called on Mr. R.C. Ellis to move a vote of thanks to Mr. Griffiths for his excellent paper, and for his consideration to the Institution in coming to Canberra to repeat it for the Inaugural Canberra Technical Meeting of the Institution.