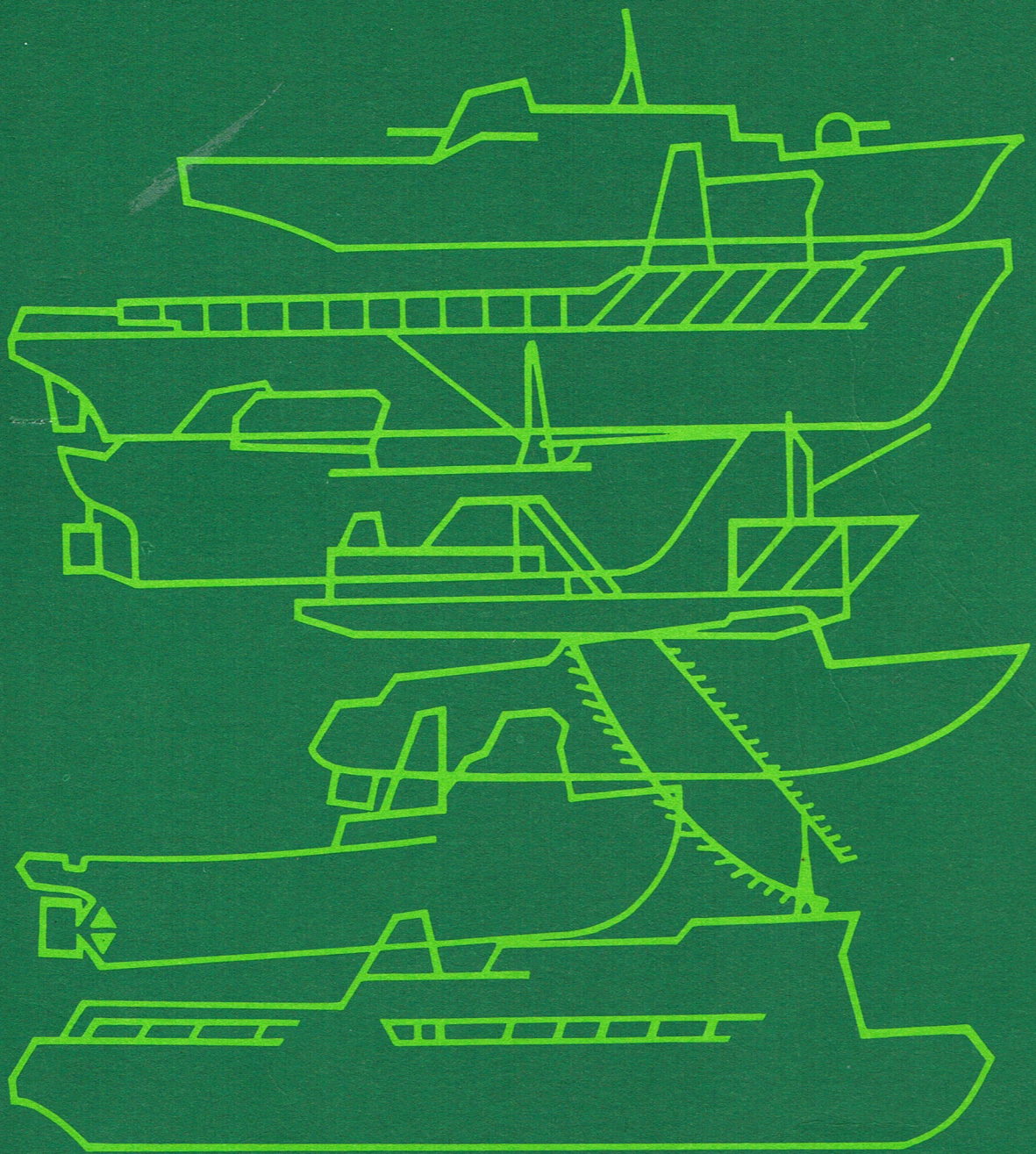
australian symposium on SMALL SHIPS

at the university of new south wales 4/5 november 1975



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AUSTRALIAN SYMPOSIUM ON SMALL SHIPS

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THE AUSTRALIAN SYMPOSIUM ON SMALL SHIPS

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS,
AUSTRALIAN BRANCH

THE INSTITUTE OF MARINE ENGINEERS,
AUSTRALIA/NEW ZEALAND DIVISION

AUSTRALIAN GOVERNMENT DEPARTMENT OF TRANSPORT

THE UNIVERSITY OF NEW SOUTH WALES

at the University of New South Wales
4th-5th November 1975

VOL. III - SYMPOSIUM DISCUSSION

C O N T E N T S

ISBN 0 9599829-7-3

WELCOME

by

PROFESSOR RUPERT MYERS

Vice Chancellor
University of New South Wales
Sydney

SUMMARY

Good morning Miss Davenport and gentlemen. Some quite long time ago my colleague, Professor Fink, wrote to me asking if I'd agree to the University being a co-sponsor with the other organisers of this Symposium, if I would also come and welcome the delegates and the opening speaker. I said yes with pleasure so now the day of reckoning has come, I am here to do just that and I am delighted to be able to do it. This kind of gathering in principle is one which takes place almost throughout the year in the University. We have a constant stream of different kinds of organisations with some kind of association with the University using our facilities for conferences and symposia and the like and as far as I'm concerned it is an arrangement we welcome.

It's good, first of all, to see the facilities used for purposes other than the particular purpose of teaching, because, though it increases our overheads, in a way, it is a small cost we bear with pleasure because it increases the utilisation of our facilities. Much more importantly we welcome it because it brings onto the campus a whole range of people who we would like to have and welcome onto the campus so that they know what it looks like and because it brings into our environment a tremendous range of different interests. Yours is one of many and I think a very fascinating one, so I welcome you all very warmly.

I gather that there are some amongst you who have been here before to either other symposia or symposia in this series so if you are familiar with the campus and know its layout, to those of you who don't I hope that the weather is such, and the programme is such that you will have a little time to wander around and look into some of the nooks and crannies. You won't be quite so shocked this week as you might if you had been here last or other weeks because all sorts of things go on in the nooks and crannies during ordinary session times, but of course the one week above all others when students study is the week just before the exams, I guess they are all doing that and if they aren't, they should be.

Some students are here and they are getting a continuing education by attending so I applaud them particularly. The interesting thing about this symposium, I understand, is that you have gathered here essentially a fairly homogeneous group of practitioners in the small ships business and so there should be a pretty close rapport between each and the other. I suppose it is this which has encouraged the organisers of the Symposium to take a brave step, a courageous step, and I hope not a dangerous step, in arranging for the Symposium to be like a Symposium really ought to be. That is a continuing discussion and exchange of views on the basis that you have all done your homework by reading all the

papers and so on. I congratulate the organisers in making that assumption because whether you accept it or not it really is a great compliment and I hope that it's not ill found.

The relations between the University of New South Wales and the professions and businesses that bring you here are good, have been continuing over a long time and I think are unusual and perhaps even in some respects are unique in that the University of New South Wales, almost since its earliest days, has had an interest in Naval Architecture and certainly a number of people have been interested within the Engineering Faculty and some outside it, in matters of concern to transport and especially to ships. I say that we're proud to be in this position and I am especially delighted that one of our most senior members in the University, the Dean of Engineering, Tom Fink my colleague here, has a very special interest in this area. I am proud too on behalf of the University, that he is taking a leading part in the top level thinking of these operations.

So for all of these reasons the University particularly welcomes its opportunity to co-sponsor the venture and to be associated with education in the field.

One aspect which is notable and certainly unique, is that when the present Government abolished tuition fees for students, at the same time it abolished the whole series of Cadetships and Scholarships, especially those in Engineering, which it had been in the habit of sponsoring, with one exception and I think it's a great credit to the Government that in the field of Naval Architecture it didn't abandon that sponsorship, perhaps it's an indication of the importance that it attributes to the need to bring along a few, but I think well educated young people, in the field of Naval Architecture.

Now my principal task of course is to welcome you, which I do warmly and to introduce the opening speaker, Mr Halton and I will do this in a moment with pleasure. I just want to say to him before I do this is that in a few minutes I have a meeting of our Professorial Board and that's the kind of meeting I don't normally aim to miss, it's not that I don't want to listen to what he is going to say, indeed I have had the pleasure of reading a draft of what he might say, and I think you will find it interesting and provocative, it's just that other activities call, therefore, I hope he will excuse me and I hope you will too. Although many of you I'd imagine I might have the pleasure of seeing tomorrow night when I join you at some of the other aspects of your Symposium programme.

Now the University is a big one, you have a big programme but I hope you will find time to look around it and I hope those of you who are visitors to Sydney will find a little time, perhape even though late at night seems to be the only time, but it's not a bad time, to look around Sydney as well, as a lot of interesting things are going on and I hope that you have a pleasant and fruitful time in your discussions. I hope too that you will take away some ideas that are tucked into some of the papers and particularly the seeds sown by Professor Fink with regard to two things, one is the possible benefits, and I think the probable benefits to be derived from engaging in research in what is a very tough industry and one which

is probably very competitive and in some difficulties. I hope you will have read what Professor Fink had to write and probably listen to what he will have to say about the need to do work in this area and I applaud what he's had to say about that. The other thing is that when the going is tough and the competition is great it's usually advisable to make sure that the people who are helping to run your enterprises have had a good education so may I just commend to you the fact that graduates have been coming out of our appropriate programmes for your industry for some years and will continue to come out. You might care to give them a thought to see whether it would be possible to take even better advantage of them than has been done in the past.

I welcome you to the campus and especially to you, Mr Halton, and hope you have a happy, pleasant, rewarding time. I have much pleasure now in introducing the opening speaker to address us and that is Mr Halton, Secretary of the Australian Department of Transport. Lady and Gentlemen, Mr Halton.

OPENING ADDRESS

by

MR C. C. HALTON

Secretary
Department of Transport

SUMMARY

Thank you Professor Myers, Chairman, Professor Fink, Lady and Gentlemen. It was in fact on 30 September 1974 that Tom Fink wrote to me to advise me that the Royal Institution of Naval Architects, the Institute of Marine Engineers and the University of New South Wales were considering putting together a two day Symposium on Small Ships and in that letter he enquired whether my Department would consider to act as their co-sponsor.

Lady and Gentlemen, I must start to congratulate Professor Fink and the co-sponsors of this Symposium for meeting the aims which they forecast in that official letter. As I understand it the number of people who have signed on for this Symposium is about 220 which is 10% over the forecast attendance and the sponsors have persuaded the authors to submit their papers well before the event. In fact they have exceeded their own forecast, because Tom Fink told me there was going to be one volume and one volume duly did appear about 2 months ago if I remember rightly. What he didn't tell me was that there was going to be a second volume so we've got a 100% over shoot on the papers, and I would hope that most of you, in fact, I would hope all of you have had an opportunity to go through that material.

As one or two of you know I have been overseas for the last couple of weeks and I have to beg forgiveness for not having read the whole of the second volume but I did read the first volume before I went overseas. I was very encouraged with the quality of the papers there, because I do feel that if as Professor Myers was saying, when he's going to try to run a seminar of this nature, it really does make it much easier if the papers have been published and if they are of a quality which encourages people to read them before they actually get to the seminar itself.

I always have a slight difficulty when I stand on my feet at seminars of this nature, to try and sort out what type of opening remarks you want from a speaker. Some of you may know that my professional career has not been entirely as a bureaucrat, I spent the first 15 years of my professional life in what we now call the Aerospace Industry, actually designing and building things and it is only in more recent times that I have come into Government. But I did eventually come to the conclusion that although I might ventilate some views about the future of either the shipbuilding industry or the ship operating industry, perhaps what I should try to do in these remarks is to relate the future of the small ships industry in general to the work of my own department. Perhaps one of my reasons for doing that is that I for one do very firmly believe that all of us who are in one way or another related to the transport industry are related to what I frequently call the service industry.

Although my Department is a very large department and obviously one of our functions is to be supportive of whatever is the Government of the day in achieving its own specific objectives, we are a department which is set up to support the transport industry in the broad, the ship industry both building and operating is a very important part of that industry and there I for one do very firmly believe that one of the things which we have to do is to make sure that the programmes which we pursue, the programmes which we sponsor, are supportive of that industry, and that perhaps is one reason why I say that we in the department do have a very real interest in ships and in ships of all sizes. That interest goes through from the very earliest stage when owners perceive of a requirement, either for the coastal or the overseas trade; it goes through the design and building of those ships to the final operation of those ships and in doing that it obviously has to take account of the contribution which vessels of all types can make both to the economic and social development of Australia.

I certainly don't intend to delay the symposium today by itemising the various functions that the Department performs which relate to the design, construction, operation and maintenance of small ships. Rather I propose to indicate in very general terms our involvement and to give a few personal views on how I would like to see these develop in the future if we are to provide adequate support to the industry.

Broadly the Department's involvement can be summarised under five broad headings

- Firstly the safety of vessels and people at sea. This involves the safe physical construction, condition and operation of ships and of their equipment such as life saving and fire appliances, and it involves such things as cargo safety, ship stability and load lines. It also extends to the Department's involvement in Search and Rescue operations through the Marine Operations Centre and it extends when necessary to Courts of Marine Inquiry.

- Secondly we have a Coastal Service Division which is involved in the provision of a full range of navigational aids for seafarers.

- Thirdly, our involvement extends to the training and licensing of operators - issues which are of particular interest to the Department's Standards Division.

- Fourthly, through our Shipbuilding Division we're involved in the design of ships, both small and large.

- And finally of course, responsibility for the administration of the Government's shipbuilding bounty arrangements is undertaken by the Department. In discharging this responsibility we work very closely with the Australian Shipbuilding Board - and since Tom Fink is the Deputy Chairman of the Board, that particular link also keeps us in touch with relevant academic work in the fields of ship design, construction and performance.

I should perhaps add that we're also ship operators ourselves - because in addition to our four lighthouse supply vessels we also charter and make use of a range of other small ships. So as a Department we are vitally concerned with the matters you will be discussing over the next two days and I was pleased to see that a number of officers of my Department will be taking an active part either as session co-ordinators or as contributing authors.

The papers which have been prepared for this symposium cover all facets of shipping as they apply to small ships which, for the purposes of the symposium were defined by the sponsors as being those of up to 60 metres in length.

The success of any vessel, depends in very large measure on the efforts of the designer, on the builder and subsequently, on the crew, but at present there are no requirements for the crew of most small ships to be professionally qualified.

You will be aware that the Government has decided to establish an Australian Maritime College at Launceston and that legislation for this purpose has passed through the House of Representatives and is currently before the Senate. Whilst the college will cater primarily for the "big ship" seafarer, the needs of the "small ship" man have not been entirely overlooked.

My Department, working in conjunction with other member authorities of the Association of Australian Port and Marine Authorities, has decided to take up with the appropriate education authorities the question of early development of technical education courses for personnel operating small merchant and fishing vessels.

As many of you know some facilities in this field already exist in Melbourne, Sydney, Newcastle and Fremantle and it is intended that these should be extended to provide a range of courses throughout the country which will serve the needs of the local operators - and compliment the provisions of the Australian Maritime College.

But in the meantime, small vessels will unfortunately continue to be manned by crews skilled in special tasks such as fishing but not necessarily skilled in good ship keeping practices.

I know that the absence of trained shipboard personnel involves designers in some difficulties in the production of working vessels and there was a recent accident which highlighted this very problem. Whilst I realise it is neither practical nor desirable to design a vessel which is to all intents foolproof, it seems that until our training schemes are further advanced designers of small craft must be mindful of wide variations in level of skill of the operator of the ship.

Whilst on the topic of ship design I might offer one further thought. We should, I think, always remember that a ship is basically a vehicle for the carriage of goods or people, or a platform which enables people to carry out a particular task or service. Too often there is a tendency to try to maximise technical performance or operational capability. We should always clearly define the task to be performed and then design an operationally

safe ship which is the most economic - in terms of capital investment and operating cost - to undertake that task.

Over the last ten years there have been significant changes in the structure of the Australian merchant fleet and these changes have certainly enabled Australian designers, shipbuilders and owners to extend into new areas of marine technology and to gain considerable expertise in new ship types. Much of this impetus has been given by the search for oil and minerals in offshore areas around the Australian coast but in addition the need for support vessels such as tugs and dredgers to maintain an expanding export trade has also benefited local shipping and the shipbuilding industry.

I am pleased that some of the vessels which I have mentioned - offshore supply vessels, fishery research vessels, tugs and ferries are to be examined here in the next two days.

One type of vessel which has done much to open up uninhabited areas of Australia and which is more common here than in many parts of the world is the landing barge. During my perusal of the papers which have been prepared for this Symposium I was frankly disappointed that I didn't find any reference to these sturdy vessels which as some of you will note my own Department uses, in conjunction with its Lighthouse Supply vessels, to in fact do our support function around the coast of Australia but I hope that some of the operational features of these vessels will be discussed during tomorrow's sessions.

One important aspect of ship construction and operation which will receive warranted attention in your deliberations is the use of construction materials. Gone are the days when timber and steel provided the only choice for the builder and for the owner. In a country such as Australia with a large area of tropical and subtropical coastline, materials which demand a minimum of maintenance must be attractive to owners. Ferro-cement, glass reinforced plastic and aluminium all offer advantages provided due account is taken of their basic characteristics.

I have read recently of one material which does not seem to be mentioned in the papers, but which is alleged to have advantages in tropical waters, that is copper-nickel. The resistance to barnacles, fouling and corrosion in an experimental vessel is claimed to have made the economics of this material attractive and I hope that we will hear more of this, and of similar experiments in the seminar discussions.

It is pertinent to mention that the Australian Government has recently introduced into the Parliament a Bill which proposes to extend the coverage of the Navigation Act to a number of other aspects of the operation of small craft. For example, the International Collision Regulations are to be applied to all vessels as part of the national law. Provisions are also included in the Bill relating to the operation of small vessels which service oil rigs etc. This will mean that the same conditions of survey, manning etc. will apply to these vessels irrespective of where they are working of the Australian coast in activities associated with the Continental Shelf.

The voluntary ship reporting system, except for vessels undertaking voyages of less than 24 hours, will also become mandatory for all vessels if the amendments to the Navigation Act are passed and this requirement will certainly assist my Department in particular in discharging its responsibilities for search and rescue or mandatory reporting of voyages which is now done on an entirely voluntary basis.

Another matter which relates to small craft in which the Department has been actively engaged in recent years is the development of a set of uniform manning and survey requirements covering vessels of all sizes. This exercise is being undertaken in conjunction with the State Marine Authorities and will provide a uniform basis on which the Australian and the State Governments can legislate in respect of all craft. This is a matter to be dealt with in the first paper on the programme this morning and I do not intend to anticipate Les Etherton's remarks but I should mention that within the last twelve months the Australian and State Ministers with responsibilities for these issues have decided to meet regularly as the Marine and Ports Council of Australia, a decision which should improve the degree of co-ordination throughout this particular field.

I am sure that all these initiatives which I have been reviewing are positive steps in the interest of small ship safety and efficiency and as such will complement progress being made by other sections of the ship building and of the ship owning industry.

I see from the papers that it is estimated that on the Australian coast there are about 1,500 vessels in the 15 to 60 metres category. One of my officers - with a great deal of courage and perhaps very little caution - has estimated that the replacement costs of these vessels could well be of the order of $300 million. Without placing too much reliance on the accuracy of this estimate it will I think serve to illustrate the significance of the matters discussed at this symposium.

It is only the larger of these vessels - fishing vessels over 21 metres and other vessels over 150 gross tons that are eligible for the Government's shipbuilding bounty which is administered by my Department. I notice that there are two papers dealing with this scheme which will come up for discussion at the symposium. One by Mr L.B. Glover is entitled "A Solution to the Added Costs Imposed on the Small Ship Industry by Government Assistance". Certainly the title and certainly some of the material in the paper are provocative enough and will no doubt create a lively discussion, and I think some of us from within the Department and perhaps from the Shipbuilding Board as well are looking forward to that discussion later in the seminar and I promise you that at the end of the discussion we'll still be speaking to one another.

I conclude by reminding you all of what was said on the leaflet circulated by the organisers outlining the purposes of this symposium. In that leaflet it says

- "and it will provide the opportunity for interchange of ideas and experiences relating to the Australian small ship industry, thus furthering the objectives defined in the

Royal Charter of the Royal Institution of Naval Architects - 'having for its objects the improvement of ships and all that specifically appertains to them' - and the parallel objectives of the Institute of Marine Engineers as defined in its Royal Charter which include - "the promotion of the scientific and practical development of marine engineering in all its branches'".

Soon after the Department of Transport was established by the Government in November 1973 one of the first things which the Departmental Executive did was to develop a series of policy, operational, regulatory and developmental objectives which have since been used to guide the work of the Department. The developmental objective as we identified it nearly 2 years ago now was 'the encouragement and promotion of socially and economically desirable improvement, innovation, growth or phase out of modal and intermodal transport'.

The purposes of this symposium certainly support that departmental objective just as they certainly support the objectives of our co-sponsors and it therefore gives me considerable pleasure to declare this symposium open.

UNIFORMITY IN AUSTRALIA OF SMALL SHIP RULES

CO-ORDINATOR : MR R. J. HERD

Department of Transport
Melbourne

QUESTION - P. EDMONDS (Vickers Cockatoo)

What is the recent experience of the accuracy or otherwise of current and proposed subdivision arrangement?

What ships have been lost and what ships protected by the arrangements being considered in the uniform code?

ANSWER - R. HERD

The subdivision arrangements being considered are as outlined in the paper. There have been few losses occasioned by unsatisfactory subdivision. Australian Government legislation is based on the traditional approach but Group 3 is considering the approach to small passenger vessels used by the U.S. Coast Guard.

IMCO have produced a new approach based on probabilistic methods which has not as yet been tried in Australia. For the present, until sufficient experience has been gained in its application, IMCO are regarding this method as an equivalent only to the traditional method.

The State marine authorities consider the traditional method too long and tedious and would prefer the simpler U.S. Coast Guard method. The significance of its use and the tolerance of error are being explored.

In Australia some 70 ft. offshore crew vessels were subdivided using the direct calculation without difficulty.

ANSWER - D. EYRES

New Zealand's Passenger Ship Construction Rules give effect to the 1960 SOLAS Convention. For the smaller vessels carrying more than 50 passengers the designers are required to submit a direct calculation for one compartment standard.

QUESTION - C. E. BODEN (C.E. Boden and Associates)

In designing charter vessels for certification for use in fishing, carrying passengers on short coastal voyages etc., difficulty has been experienced in complying with subdivision requirements without restricting movement within the vessel.

Proposals for provision of W.T. doors have been refused by the Maritime Services Board. High hatch coamings which have been required on the weather deck even within passenger compartments have also created difficulties.

Could the Department consider such vessels as pleasure vessels where the passengers pay a fare but are willing to accept some disability and risks?

Could there be introduced a vessel classification to cover these requirements? Could some relaxation in respect of movement within a vessel be anticipated?

Has the opinion of consultants been received or sought, or is there dependence only on the experience of Departmental officers?

ANSWER - R. HERD

A passenger vessel for unlimited service has been defined in the Uniform Requirements as one which carries more than 12 passengers. For any other type of service, a passenger vessel is one which carries more than 6 passengers.

The subdivision and damaged stability requirements have not yet been finalised. The question of provision of W.T. doors is under consideration and a State proposal in this regard will be considered in February 1976 at the next Group 3 meeting.

The consultation with industry is outlined on page 1-5 of the paper.

R. PEARCE

Could those interested in receiving documents for comment please leave their names and addresses with their State Marine Authority or with the Department of Transport.

QUESTION - N. ABBOTT (Adelaide Steamship Co. Pty Ltd.)

Could I raise for discussion several problems experienced in tug operation?

- The regulation bulwark height of one metre seriously restricts working capability in trying to get lines on board. Heights have progressed from 12 to 18 inches which are ideal for getting lines on board, through 2 ft. 6 inches to 1 metre. Jack stays and stanchions on top of a solid low bulwark would give necessary crew protection without being an operational impediment.

- Provision of $17\frac{1}{2}$ inch coamings around upper deck accesses to internal spaces creates difficulty in moving about as well as possible damage to the legs through hard contact.

- In respect of wheelhouse windows fitted with thick glass and also shutters, experience since 1937 in the industry has not produced a single instance of a broken wheelhouse window. A surveyor had stated that the reason for high coamings in wheelhouse access hatches was a precaution against flooding should the windows be damaged. It is very difficult to fit external weather screens to many wheelhouse windows, particularly in a 3-tier structure.

- Fire retardent doors fitted in accommodation are not permitted to have hook backs and must have self closers. They are fitted with kick out panels which for a person the size of the speaker are impossible to traverse. In the event of an accident, the occupant of a cabin fitted with such doors would be likely to drown or burn.

  To date no fires have been experienced but entry into accommodation spaces against the resistance of a door closer, particularly on small ships is difficult.

ANSWER - R. HERD

Taking the points raised in turn -

- The Navigation (Construction) Regulations and the Navigation (Load Lines) Regulations give effect to the 1960 SOLAS Convention construction provisions and the 1966 Load Lines Convention respectively. Australia, having signed both these Conventions must now honour its obligations which it does by means of inter alia, these two sets of regulations. The terms of the Conventions were agreed by delegates from a large number of maritime nations as being fair and reasonable.

- The 1966 Convention raised the coaming height for ships from 36 inches to 1 metre. In 1968, following a request from tug owners, the Australian Government decided that for tugs the bulwark height could be 36 inches. There is no prohibition on the use of a part height solid bulwark surmounted by wire rails and collapsible stanchions.

  For tugs under 24 metres reduced heights have been agreed with the States. These were circulated to interested parties last May.

- The 17½ inch coaming height in position 2 is a basic Convention requirement applicable to vessels of 24 metres load line length and above. This has been reduced by agreement with the States as advised in the May letter. The Department in giving effect to the 1966 Convention decided that it would exercise its option to reduce coaming heights in positions 1 and 2, as provided in the Convention, only in respect of hatches which would remain closed at sea. Hatches which would be opened at sea should retain the standard height in the interests of the safety of the ship and of the crew.

- The standard for thickness of wheelhouse window glass applied by the Department is the international standard. It was understood that New Zealand had some unfortunate experiences.

ANSWER - D. EYRES

- Two fishing vessels were lost about 1970 due to glass in rubber mouldings being pushed in. This has now been banned. Fishermen with existing craft fitted with windows set in rubber mouldings now fit retaining clips for safety.

QUESTION - N. ABBOTT

Did these fishing vessels have their wheelhouses at deck level?

ANSWER - D. EYRES

Yes, the wheelhouse was at the end of the forecastle. The vessels were about 65 feet long, Seiner type.

ANSWER - R. HERD

- The height of hatch coaming in a wheelhouse is not related to the window glass, but to the wheelhouse position.

If the wheelhouse is at deck level, then -

- It must be regarded as a deckhouse or superstructure on the weather deck.

If it is a second tier structure, then -

- It must be treated as a deckhouse on a superstructure or deckhouse. If a third tier structure, then as a deckhouse on a deckhouse or superstructure.

Where a superstructure or deckhouse on the freeboard deck gives access below the freeboard deck then any openings in the superstructure deck or the deckhouse top must be protected by:-

(a) A hatchway with appropriate strength and closure, or

(b) A companionway with appropriate sill and door, or

(c) An efficient deckhouse with door and sill appropriate to that position.

The appropriate position for most vessels will be position 2. It is accepted that wheelhouse doors for navigational reasons do not comply. Therefore the wheelhouse deck is regarded as being exposed and therefore the internal access to the space below must comply with requirements appropriate to its position.

It is suggested that if anyone in the industry feels strongly about the necessity to fit Convention coaming heights in this position that formal application be made to the Department, supported by evidence for a proposal for an amendment to the Convention to be submitted for discussion by IMCO.

While this may take some time to process, this is the only avenue for amendment to unacceptable requirements.

Some ships are known where the wheelhouse door complies with the Convention requirement then there would be no requirement for a coaming round the access hatch within.

QUESTION - C.E. BODEN

Quoted a case where both doors and hatchway with coaming, cover and clips had to be provided.

ANSWER - R. HERD

If the door did not comply with the requirements appropriate to its position then both the door and the hatchway could well be fitted. If the door complies, then no hatchway closure is required.

There are combinations of doors, hatchways and sills which can be examined to both meet the Regulations and also provide ready access within a tug.

- As a point of general application of the 1966 Convention, provision is made for Administrations to increase freeboard beyond the geometrical freeboard for two types of vessel -

  Sailing Ships

  Tugs

  In giving effect to the Convention the Australian Government decided that no such addition would be necessary for tugs provided that the conditions of arrangement were met.

  The application of requirements can, of course, be different for tugs of under 24 metres load line length compared with those of over 24 metres length.

  Another point is: does the tug owner really want an International Load Lines Certificate for a tug which spends almost all its life in port? To obtain this certificate he must comply with requirements, some of which he finds irksome. The avenue is open to obtain Load Lines Exemption Certificate for an occasional International Voyage. This approach is submitted for consideration by owners in relation to their needs.

- The 1960 Safety Convention is vague in respect of cargo ship structural fire protection, calling for alleyways to be lined with 'B' class panels which are not defined. Presumably these are panels of fire resisting material which has been used in an approved 'B' class division.

This requirement has been interpreted differently by different countries.

The Australian Government interprets this as requiring alleyway divisions and doors to be of approved 'B' class incombustible divisions, thus making the alleyway viable for 30 minutes, with temperatures limited for the first 15 minutes of that time.

In developing the Navigation (Construction) Regulations, no provisions were included to cover the use of hook backs, curtains or kick out panels. Legislation to cover these questions is presently being drafted, but the date of coming into force cannot be forecast yet.

The standard hook back fitted behind a door is of no use during a fire. There are three possible solutions -

- Electro magnetic hook back
- Pneumatic hook back
- Standard door closers incorporating a fusible link.

The electro-magnetic hook back is attractive especially when used in conjunction with release from a ceiling detector.

The pneumatic hook back involves the supply of an air through a plastic tube which burns early in a fire and closes the door.

The matchet type door closer with in-built fusible link while used extensively in buildings, is not robust enough to resist rolling and pitching forces.

Kick out panels are presently filled by shipowners only on a voluntary basis. The size is limited by door strength. Before deciding on the size we consulted with a wide range of safety and other authorities throughout the world. The width of 16 ins is determined by the need to retain strength in a door. The standard 24 inch door with 16 inch panel and two four inch stiles is the limit for structural strength. Eighteen inches was fixed as the minimum height which would permit exit by a well built man.

Some countries require a damper to be filled to the grille in the panel, but where the grille is used for return air this is difficult. However, the presence of the grille permits smoke to filter out from a cabin fire and so lead to early detection. Full scale tests have established that provision of a grille in the lower part of a door will not feed a fire.

The Navigation (Crew Accommodation) Regulations require one drawer in each cabin to be lockable. Though the kick out panels may be removed easily, it is considered that personal security in no way conflicts with personal safety.

QUESTION - P. TURLEY (Dodwell and Co. Ltd.)

Will the proposed mandatory fitting of electro-magnetic hook backs add significantly to the rapidly escalating ship costs? Will a rational approach to the matter of equipment costs be adopted when developing regulations?

ANSWER - R. HERD

It is not considered that costs would be other than minimal. In all aspects of ship safety, great difficulty always arrives in assessing the worth of the lives of the crew. This topic is worthy of a cost benefit analysis.

The matter of rationality in prescribing provision of equipment is applied by the Department in considering regulations.

QUESTION - F. WESTHORP (Department of Navy)

Questions and comments are generally personal, based on experience as a naval architect in a small shipyard and as a consultant.

The Navy have found that windows low down in a vessel which are mounted in rubber are useless, as they tend to become unseated.

In respect of charter vessels many have found crews who find heavy hatch covers hard to handle, and together with lady visitors, high sills difficult to hurdle.

Supporting Captain Abbott, Lindsay Lord stated that ship motions are inversely proportional to ship size.

Fire doors have provided operational difficulties. They tend to jam or be jammed open thus nullifying their purpose. Crew members have been hurt trying to pass through against the spring of the closer, particularly with both hands full. Water walls are suggested for examination as an alternative.

Outstanding work listed does not mention hovercraft. As it is understood that hovercraft in Australia have now been declared ships, could provision be made for these?

The Constitution generally states that matters which are common throughout Australia should be administered by the Commonwealth. Waterways surely come into this category. Why therefore can't there be only one Navigation Act and set of Navigation Regulations, locally modified for specific conditions in specific ports by, for example, the Maritime Services Board.

ANSWER - R. PEARCE

Air cushion vehicles are now being treated separately by an A.A.P.M.A. committee which is trying to modify the British Requirements to suit Australian conditions when appropriate.

Under the Queensland Marine Act, A.C.V.'s are now included

in the definition of "vessel". For those States and the Commonwealth which have legislation based in part on the U.K. Merchant Shipping Act A.C.V.'s are considered separately. Under U.K. legislation, special application of existing legislation to A.C.V.'s has been made, since the A.C.V. is not a vessel.

QUESTION - L.B. GLOVER (Consultant)

The Bounty Act permits an owner to build a vessel overseas. What provisions does the Department make to ensure that when such a vessel is imported the owner is not met with considerable additional expense in additional equipment or alterations to meet SOLAS 60 as interpreted in Australia?

ANSWER - R. HERD

SOLAS 60 in some aspects gives Administrations the right to determine individual requirements. A vessel building overseas for entry into Australia would be surveyed by the Classification Society on behalf of the Australian Government in respect of those matters which fall in the ambit of the surroundings authority. Other matters would be surveyed by the Government of the country of construction on behalf of the Australian Government. Equipment e.g. fire extinguishers, would be fitted to the Australian requirements, rather than those of the country of construction. Fire divisions etc. would have been tested to a standard laid down by IMCO and would be approved by Australia based on those tests.

Thus a vessel building overseas should have been built to comply with Australian requirements and so not require expensive alterations or modifications on arrival in Australia.

QUESTION - T. AMUNDSEN (Norske Veritas)

Referring to page I-40, why does the New Zealand Government not exempt classed vessels from survey by the Marine Division? New Zealand is probably the only country in the world that does this, despite the rapidly increasing technical sophistication and complexity of modern vessels.

ANSWER - D. EYRES

The Shipyard Seaman Act provides that N.Z. vessels under construction must be surveyed by a surveyor of ships, who is defined in that Act as a surveyor of ships of the Ministry of Transport.

The Act which is a very old Act, is currently being re-written and the provision quoted will no doubt be re-examined then.

QUESTION - N. RILEY (Consultant)

Do the fire protection provisions of SOLAS 60 apply down to vessels of a size covered by the Navigation Act? If not, why does structural fire protection have to be fitted to Australian vessels below Convention size?

ANSWER - R. HERD

SOLAS 60 limits structural fire protection in cargo ships to

vessels of 4000 tons gross and above. When considering Australia's application of SOLAS 60, after extensive discussion, it was decided that the needs of smaller vessels for protection were equally as great, if not more so and there should be no bottom limit. This lead is now being followed by IMCO whose new cargo ship structural fire protection requirements adopted at the 1975 assembly extend to 500 tons gross with the usual recommendation to Governments to apply these requirements to all vessels.

The 1977 International Convention of Safety of Fishing Vessels, it is expected, will apply S.F. protection to vessels of 24 m load line length and above. The standard will be most probably somewhat less than the new cargo ship requirements. When this Convention is drawn up IMCO plans to turn its attention to vessels of less than 24 m.

IMCO statutes and the views of many member countries support the view that the smaller vessel is in at least as much need of S.F. protection as larger vessels.

Since 1913, the philosophy of construction and safety equipment has been directed towards getting people off vessels which are damaged and likely to be lost. Structural life in the event of fire has been based on a minimum of 1 hour as being an appropriate time for saving life.

In small vessels, people can either be on board or over the side in the event of fire. In larger vessels with fire aft, under suitable wind conditions, the forecastle could provide an alternative refuge.

Recent search and rescue experience suggests that despite its colour, an inflatable raft is not easy to find at sea.

The Department's view is therefore that the standard of S.F. protection on small ships must be at best equal to that on larger vessels and that provisions for extinguishing fire so the crew can remain on board the smaller vessel is essential.

The new IMCO cargo ship requirements which differ in some respects from current Australian practice will be examined for incorporation into legislation.

QUESTION - F. WESTHORP (Department of Navy)

Is there an Australian Register of Ships? The Navigation Act requires ships on the Australian Register to comply with various requirements.

ANSWER - R. HERD

There is no Australian Register of Ships. The question has been looked at for some years, but legislation has not yet been brought forward to initiate such a Register. In the meantime Australian Vessels remain as British ships registered in Australian ports.

QUESTION - D. DIXON (Sydney Technical College)

We see some expensive looking multi hulled "coffins" afloat. Is the Commonwealth looking at the seaworthiness of these? We know they are reasonably stable.

We see hydrofoil craft moving round Sydney Harbour at great speed without headlights. Is this under consideration?

We sadly lack on effective rescue organisation. Do we intend to follow the U.S. Coast Guard arrangement which would form a good model?

ANSWER - R. HERD

No. The regulation of multi hull yachts does not at present fall within the ambit of the authority of the Commonwealth.

Regulation of hydrofoils on Sydney Harbour falls out with the Navigation Act.

The Department's Coastal Services Division regulates search and rescue activities in Australia and their future plans are not known.

QUESTION - R. HAWKE (Whyalla Shipbuilding and Engineering Co.)

Mr Herd has been answering on behalf of the Commonwealth. Could we have the views of the States?

ANSWER - W. ARMSTEAD (Maritime Services Board)

The questions principally have been directed to the attitude of the Commonwealth in various matters. However, one or two comments on points raised earlier may be appropriate.

Mr Boden raised the question of coaming heights to hatches leading to below deck accommodation spaces. These are necessary to prevent early flooding of these spaces.

In response to Mr Edmonds concerning the need for subdivision of smaller vessels. In the Board's experience none have been lost and none damaged. The Board feels that this experience is not an acceptable basis for not requiring subdivision.

Mr Dixon raised questions re operation of hydrofoil craft. This is regulated by the Board's Shipping Branch who require these craft to carry a flashing amber light in addition to the normal navigation lights. Smaller craft carry normal navigation lights. Each type of craft is aware of the other and since the hydrofoil craft can stop almost where it is by cutting power, no disadvantage is seen.

ANSWER - MR R. PEARCE (Marine and Harbour Board, Queensland)

The paper has been presented on behalf of the Association of Australian Port and Marine Authorities and represents the feelings of the States and the Commonwealth. It is presented today by Mr Herd who chairs one of the Working Groups in the absence of the

Chairman of the Committee, Mr Etherton.

For convenience the Chairmen of the Committee and the Groups are Commonwealth officers.

ANSWER - A. McALLISTER (Harbour and Lights Department, W.A.)

Apart from dredges etc. it is only in the last 8 years that we have had boats under survey. The Regulations were first introduced in 1948 and amended to 1966. They are out of date in some respects and also contain large gaps where no provisions are made. W.A. is looking to the A.A.P.M.A. Committee for guidance in requirements for small vessels. The documents produced do have the agreement of all parties to the discussions.

W.A. is looking at cheaper ways of establishing the seaworthiness of the smaller craft, ways in which the cost of determining seaworthiness bears a reasonable relationship to the value of a small vessel, in order not to impose an unreasonable burden on the small craft owner. W.A. feels sure that the result of the A.A.P.M.A. exercise will be effective in this regard.

ANSWER - B. BROWN (Marine Board of Victoria)

The Marine Board operates under the Marine Act which is a very old Act. There are a number of sets of Regulations made under that Act. There were some difficulties when the Fishing Vessel Regulations came into force in 1967. An advisory committee representing all interests was set up to assist in solving problems. For other craft e.g. tugs, passenger vessels, a close liaison is maintained with the Trust engineers, the passenger vessel operators etc.

The Board is fully represented in A.A.P.M.A. activities. The documents are passed to industry for comment.

Because of this close liaison a successful conclusion is foreseen.

COMMENT - A. TAIT (Bureau Veritas)

Mr Herd mentioned that on a large vessel it was possible for the crew to huddle under the lee of the forecastle in the event of fire.

When the engine room is on fire there is not always power to keep head to sea. On a lee shore and trimmed by the stern, the ship may ground and the wind could blow the fire towards the forecastle.

On a ship recently on fire in New Zealand, which is still under investigation, the master made the decision to leave the ship, a decision with which I personally agree. 16 lives were lost. The combination of fire and heavy seas is a dreadful one.

Frequently a split second decision must be made about the action to be taken. You can't necessarily retire to the bow of the ship.

In respect of life rafts in this same casualty the wind lifted life rafts full of people off the water and the life rafts snapped in two. Life rafts are not always the answer to abandonment in an emergency.

ANSWER - D. EYRES

In the case mentioned by Mr Tait, the accommodation was located over the engine room. If the master and crew had moved to the forecastle they could not have abandoned ship because the lifeboats and liferafts would have been burned.

In the "Wahine" loss, under the conditions then prevailing, some of the life rafts were blown right over the top of the vessel.

QUESTION - P. EDMONDS (Vickers Cockatoo)

On page I-19 reference is made to the preparation of stability data for the ship's personnel. On page I-27 reference is made to a more practical approach to stability for the small ship man. This raises a question of current policy in respect of the preparation of data.

The overhaul in respect of completeness of information and tidying up of practice is long overdue. Those providing the data are required to make things more difficult than necessary by the need to work out GZ curves to meet IMCO requirements. I take my reference from a paragraph in the IMCO stability booklet which says "use a limiting GM". This has occasionally been put up as supplementary to working out areas under the GZ curves. If limit GM and thus KG for a ship for a particular displacement you control all the other features which arise from the GZ curve. Consideration should be given to approving a curve of limiting KG, KG because it is easy to work out for a loading condition, and say to the ship operation - meet this and you meet IMCO, fail this and you fail IMCO. Please comment.

ANSWER - R. HERD

In a recent casualty on the coast, the officers concerned considered that GM of one foot gave them more than adequate stability. This could have been so had the poop been intact. Without the poop being intact, the range of positive stability was only 10^{o}-15^{o} for the actual condition at time of loss. Merely establishing that GM is one foot does not go far towards giving the officers the full information as to the level of safety of their ship.

The IMCO Sub-committee or Subdivision and Stability is presently re-examining the criteria. It has been found from casulaties that the current criteria (which are minimal, though some people tend to regard them as maxima) are inadequate for some ships under certain circumstances. Some ships need a considerable margin over and above the IMCO criteria.

It has been suggested to the Department that the UK practice for small vessels of using only limiting KG should be adopted for small vessels. The Department's view is that this may be provided as supplementary data, but the Master should have complete data for

his reference.

The whole question of stability is under examination. Norway, as the result of casualty to two small vessels has raised the problem of the relationship between tonnage measurement and stability. These vessels were of the same type as a simple decked coaster with poop, forecastle and large hatchways lost here recently. (This latter vessel had been built in France for Norwegian owners).

Because of current tonnage systems, these vessels have high double bottoms which raise the VCG of both hold and deck cargo to heights proportionately greater than those for comparable British coasters.

Modification to presentation of stability data is developed in conjunction with the Branch of the Department dealing with exams and training. This Branch in turn acquaints the training schools of the requirements to ensure that the correct approach is taught to candidates.

Additionally steps are being taken to ensure that the presentation of every stability book in the vessels of the Australian fleet is uniform to enable officers to transfer from ship to ship without confusion as to interpretation of data.

QUESTION - E. BELL (Department of Navy)

The authors are commended. The paper enables those not associated with the exercise to be informed.

Could the members of the various Committees and the names of people with whom the drafts are discussed be appended?

Are manning and crew accommodation matters discussed with the unions?

ANSWER - R HERD

The membership of the Committee and the Groups is somewhat fluid due to availability, promotion, transfers etc. The names of recent participants in the Committee and Groups are as follows:

	COMMITTEE	GROUP 1
COMMONWEALTH: (Secretary)	L.N. Etherton (Chmn)	R.R. Elliott (Chmn)
	P. Heagerty	P. Heagerty
	R.R. Elliott	
	G.P. Hodge	
	R.J. Herd	
	G.P. Horscroft	
	E. Mathews	

	COMMITTEE	GROUP 1
N.S.W.	H. Wagstaffe	H. Wagstaffe
Q'LD	R.F. Pearce	R.F. Pearce D. Whitehouse
S.A.	G. Bergland	J. Gillespie
TASMANIA	R. Thompson	B. Edwards
VICTORIA	A.J. Wagglen C. Dyer	C. Dyer
W.A.	C. Hartley	A. McAllister

	GROUP 2	GROUP 3
COMMONWEALTH: (Secretary)	G.P. Hodge (Chmn) P. Heagerty	R.J. Herd (Chmn) P. Heagerty
N.S.W.	V. Franklin A. Cooke	H. Wagstaffe W. Armstead
Q'LD	R.F. Pearce J. Gilmore	R.F. Pearce R. Toman
S.A.	R. Round W. Irwin	R. Round
TASMANIA	B. Edwards N. Mudge	B. Edwards
VICTORIA	C. Dyer	C. Dyer
W.A.	A. McAllister	A. McAllister

	GROUP 4	GROUP 5
COMMONWEALTH: (Secretary)	G.P. Horscroft P. Heagerty	E. Mathews P. Heagerty
N.S.W.	H. Wagstaffe	H. Wagstaffe G. Wilson
Q'LD	R.F. Pearce D. Whitehouse	D. Whitehouse
S.A.	J. Gillespie	J. Gillespie
TASMANIA	R. Thompson	R. Thompson
VICTORIA	J. Simms K. Dann	J. Simms K. Dann
W.A.	C. Hartley	C. Hartley

OBSERVER

(Dept. of Agriculture) - H. Rogers

The list of persons consulted by the Commonwealth and States is too large to be presented here. Generally it covers builders, designers, operators, fisheries associations, material manufacturers and suppliers. Queries could be directed to any particular authority.

The unions are consulted in respect of manning and crew accommodation matters.

QUESTION - J. LAVERICK (Carrington Slipways)

Comments are made on behalf of the small shipyard. I would like to comment on the regulations and how as they are implemented they have a lot of merit. I don't go to sea and many people here don't go to sea.

To quote an example, the "Maria Luisa", a purse seine fishing vessel of Norwegian design, built by us, did not comply with Australian regulations, particularly in respect of fire protection. The overseas regulations differ from the Australian ones. It must be remembered in considering this, that in Norway such a vessel is unlikely to be more than a quarter of a mile from another vessel. In Australia it could operate 500 miles from port or refuge or assistance in time of need.

I would not like to go to sea under the overseas conditions and consider the crew need everything going for them.

As shipbuilders we comply with the regulations, but the practical application is of conern. Without good liaison with the Departments Central Office and the local surveyors. There has been good cooperation with the local surveyors and, nevertheless, difficulties have been experienced by local surveyors being overriden by Central Office. Could an arrangement be instituted to give local surveyors more flexibility in the application of the regulations?

I know that rig supply vessels have gone to sea with fire doors wedged open. This defeats the purpose. How can an approach be made so that the doors are used as they are intended and the protection provided for the crew be taken advantage of?

In another case, a 50 ft. tug, built to survey by Commonwealth which had a separate toilet and galley. The toilet was transferred and had to serve as both shower and toilet. The galley was fitted into the original toilet space which was too small to cook in. The arrangement met the regulations, but it was not practical, it was more dangerous to use than originally proposed. A more flexible approach would have achieved the purpose better.

After spending considerable money to pass survey, the regulations were changed after two years in survey. The owner thus finding Commonwealth Survey to be impossible to meet, planned his vessel under State survey. Is there a practical way to introduce flexibility into the application of regulations and avoid this type of situation?

ANSWER - R. HERD

I will take up the question of the relationship between Central Office and Regional Surveyors with the Chief Marine Surveyor. So far as I am aware, the Regulations have not changed since 1968. If you give me details of the case I will have investigations made.

COMMENT - A. COLQUHOUN (Consultant)

I disagree with much that the Department is doing. I think Mr Herd, they are unnecessarily meticulous about many points and

I feel this view is shared by many of the consultants.

I don't question your intentions, but I feel that while Mr Herd and his team are united, the consultants are divided. We are I feel, no less professional than the Department.

We need a small committee of consultants or of the R.I.N.A. to discuss points.

ANSWER - R. HERD

At the meeting held with the consultants earlier this year, we proposed that the consultants should form an Association. I have been told this is now in being.

COMMENT - J. DOHERTY (Consultant)

An association of consultants is trying to form itself. This is long overdue. In a short time we will I trust, have an association which I feel will be able to contribute an opinion on behalf of consultants and marine engineers to assist in the formation of regulations, using a reasonable and practical approach.

QUESTION - F. WESTHORP (Department of Navy)

Will that be an interstate association or limited to New South Wales?

ANSWER - J. DOHERTY (Consultant)

Interstate.

WRITTEN CONTRIBUTION:

Question - P.A. James (S.A. Boat Design Services)

Will the new requirements apply to existing vessels?

Answer - R. Herd

The application of different sections of the Code for Uniform Requirements could be different, but in general the normal provisions for existing ships will apply, i.e. any major alterations must comply with the current requirements.

If you are not already examining the draft documents, arrangements should be made for you to be given the opportunity for comment by the S.A. marine authority.

CO-ORDINATOR'S SUMMARY

Discussion was full and far ranging. Opinions were expressed by a wide range of interests, in fact from all facets of the marine industry.

While a number of the questions and points raised were unrelated to beh topics covered by the two papers, they did reflect

problems currently being experienced. I believe that the fact that all parties to some of these problems were able to air their differing viewpoints and philosophies before this representative gathering is healthy and is to be encouraged.

So far as the aim towards uniformity of marine legislation is concerned, the work being done and the work to be done have now been exposed to the consideration of all concerned, if they were not previously aware of it. This should ensure that the resulting requirements have a practical basis, and are fully discussed.

May I thank Mr David Eyres for his paper and for his participation in our Austral(as)ian Symposium.

ROLE OF SMALL SHIPS IN THE AUSTRALIAN SCENE

CO-ORDINATOR : MR R. CAMPBELL

Department of Transport
Sydney

Firstly I would like to introduce the Authors of the papers to this Session and in doing so, I would express my sincere thanks for the considerable effort which has gone into these papers.

Mr Ken Brown, Assistant Director of Naval Ship Design, whose paper deals with the Naval small craft; Mr Greg Hackworth, of the University of New South Wales, whose paper deals with the Murray-Darling River trade; Mr Harry Rogers of the Australian Department of Agriculture, whose paper deals with the Role of Fishing Boats in the Australian Scene, and, finally we have Captain Malcolm Murray and Mr Bob Fry of Westham Dredging, whose paper deals with dredgers.

Might I take this opportunity to apologise for the absence, unfortunately, of Captain Jack Knight, who has been detained in New Zealand and also Mr Needham, whose paper is presented there.

The basic theme of this Session is the consideration of the varying and expanding role being required of small ships and this, I would suggest, can broadly be achieved by posing the following queries:-

- What functions are required of the ships?
- How best can these functions be economically achieved?
- What are the technical and practical limitations?
- What future roles can be anticipated?

Those of you who have read the papers of this Session will have noted that these relate to Naval Craft, Dredgers, Offshore Supply Craft, Fishing Vessels and the River Murray Trade - quite a wide range, but with a number of notable omissions - particularly, I would suggest, Tugs and Passenger Ferries. This is inevitable within the confines of such an ambitious but necessarily brief session. However, as indicated in my introduction written for this Session, I would stress that they should not preclude queries on the role of ships other than those highlighted in these papers.

Now, without further ado, I would like to declare the floor open and invite any questions from the floor.

QUESTION - MR SCHAETZEL (Hawker de Havilland)

I would like to ask Mr Brown about his definition of the term 'Defence'.

I believe he uses the words 'Defence' and 'Defence Forces' as agencies involved in conducting major wars.

Now, I believe that currently our biggest problem is not so much Defence in terms of major conflicts, but coastal protection

in a peace-time scenario. We have 12,000 miles of coastline which we have to protect against poaching, infiltration, smuggling etc.

I would also like to refer to the words which Mr Halton used in his introduction - namely, that we should strive to design the most economic ship for a defined task.

The Defence Forces, whose main task is to fight major wars, will always look towards equipment suitable for major conflicts and such equipment is certainly not the most cost effective in the peace-time situation I am talking about.

I would like, therefore, to hear Mr Brown's views on the problem of peace-time coastal protection and the use of a civilian or paramilitary organisation, such as coastguards, using equipment suitable for the task but not necessarily required for fighting major wars.

ANSWER - K. BROWN

Thank you Mr Schaetzel. I am not sure I am in a position to be able to answer all your questions. I think your questions are representing a point of view with which many prople are sympathetic to.

The issue is essentially, should we have a coastguard peace-keeping organisation as well as a Defence Arms, or is it satisfactory to continue the way we are where a Defence Service has to provide alot of facilities to the country in peace-time, as well as being in some type of preparation for the wartime.

Economically, of course, every vehicle has to be designed to best meet the basic functions required of it. Now, if a ship, for example, has to serve a peace-time role and a wartime role, then you have a somewhat complex and difficult situation. I can assure you that the Defence people who are initiating and analysing this type of problem have this very much in mind and are trying to cope with this situation now. Newer type ships are being looked at which in wartime could be hopefully, quite successfully converted to a military type application, yet in the peace-time situation are relatively cheap to build, not too sophisticated and fulfil the peace-time role fairly successfully.

COMMENT - MR WESTHORP (Department of Defence (Navy))

On page 3 of his paper, Mr Brown lists a number of ships currently in service. Against HMAS "Paluma", I suggest that he should also include the "Gaiunda", similarly a training vessel, also I think I am right in saying the "Bronzewing" is now out of service. Going on with the paper, there are a few points I would like to make. Firstly, I am in complete agreement with the statement referring to too rapid cycling of decision-makers. In the course of building ships, which takes some years to generate and then construct, I agree that it is very foolish to "change horses in midstream". It can only lead to considerable dispute.

On the next page is the paragraph on Ship Design. Mr Brown states that a defence designer is faced with the "Committee of

Customs", and this is very true. He is also faced with the "Committee of Supervisory Experts", every one of whom has got his own particular point to sell, whether he happens to be a designer or a particular Armaments Man, or a Communications Man or a Finance Man, or whoever else he might happen to be. As far as he is concerned the ship is only the armament or the communication or the finance - it is never the ship as a whole thing and each one of them sits very very heavily upon the poor Designer's back, that is why we all have such very broad backs!

Now, the final point I would make to Mr Brown, in regard to his paper, is on page 8, where he speaks of "Compromision of Requirements, where he says that in "Buying a ship off the shelf" it is not a necessity to buy the best ship for the particular task in hand. This has been altogether borne out quite recently, where another Service, deciding to be economical, went and selected a design "off the shelf". It was chosen, and it was agreed that this would do the job. And then they discovered that it was too wide to carry along the road on a trailer without getting special permission to do so, so they cut the beam down by six inches, and then they found it was too high to go into a Hercules Aircraft while on its trailer, so they cut the height down a little bit, and then they decided it was a little bit too long anyway, so they cut the length down a bit, and the ultimate result was that when they got the thing in the water the first thing everybody said was, "the darned thing is too small and too unstable!" So they came along to us to investigate until it was satisfactory. This is, in fact, the sort of thing that can happen very easily if you try to make false economy in the procurement of vessels which have a specific role to fulfil. Undoubtedly, you can save money in design, but you can also spend much more than you will ever save by modifying, by altering and by losing out on the sustained documentation, availability of spares and the general on-costs which are involved in the maintenance of a marine vehicle right through its life to the standard demanded by our Navy, whether for wartime use or for Civilian Surveillance use in peace.

QUESTION - MR J. JEREMY (Vickers Cockatoo)

I would like to commend Mr Brown on a very interesting and honest paper, a very outspoken paper, and I was interested to note the interest and concern expressed for the manner in which we go about procuring Naval vessels of all types and the number of authorities and reverses of opinion which are involved in this.

In particular, I liked his expression which I am going to add to my collection of favourite expressions, "Paralysis through Analysis".

It seemed very apt in describing the present process of acquiring new Naval vessels of all kinds. It seems that we may have forgotten some of our very recent history. It does not exactly relate to small ships, but if I may dwell for about 90 seconds on it. A little over 10 years ago, we embarked in this country on a project on the basis quite literally, of "let's have another two just like the last two!" Which, after six years of blood, toil, sweat and tears, and, I might add, very close co-operation between two shipyards 600 miles apart, with the design authority in the middle, two very fine ships were added to the R.A.N., which,

incidentally, bore remarkably little resemblance to the previous two. Since then, we have taken as long on subsequent projects to get absolutely nowhere apart from creating several monumental piles of paper! In this period we have also seen a vast complication of the procurement process. To see this complication now extend itself to the process of buying a patrol boat is somewhat depressing. The basic aim of the exercise is, after all, to build a ship. To those of us who are used to this kind of thing in working with the Department of Defence, the process is frustrating enough, but to those of us who live in the commercial world building small ships, it must be truly astonishing! The most serious aspect of this as I see it, of course, is that if we spin out this process of procurement, and the decision times and the time between actually embarking upon the procurement projects in this country, those in the industry who actually know something of the expensive subtleties of building Naval ships of any kind, get fewer and fewer, a lot more widely dispersed, or, promoted to a level where they are no longer involved. Experience is said to be not making the same mistake twice. It looks as if soon we will all start again. Hence, I am heartened by your optimism that the pendulum will swing back again in some five years. But I would be curious to hear your comments on what you feel will be the catalyst for this swing, short of war, and I am assured there will be little chance of that!

REPLY - MR K. BROWN

I think the pendulum is swinging. Already, people are starting to learn we have alot of new blood in Defence and we have been integrated. A lot of changes have taken place although the "inactivity", if I can choose a kind word, that seems to have been occurring, has been going on for a long time. But I do think the pendulum is swinging back to an awareness that you need to do things in your own country as much as you can, even if it's a bit uneconomical at times. I would just like to mention that the U.S. Navy, which ten years ago followed the Macnamara Line and went out to industry with requirements, had competitions to see who could come up with the best technical solution to the Navy's requirements (and then the winning firm, of course, producing the hardware) now, after 10 years, have swung back to where they were and are going all out to try to pull the threads together to do "in house" design.

QUESTION - MR C. BODEN (Boden & Associates)

I would like to add a thought to the discussion, which is not particularly applicable to Defence work, but, in regard to the procurement of vessels in private spheres, I feel that one unfortunate circumstance has arisen in recent years - the concept is a very uneconomic policy to develop. It involves the expenditure of large sums of money in the preparation of designs by a number of tenderers, only one of whom can be fortunate in getting the job. It means that when the tenders are submitted, someone has the task of selecting both the best tender from a design point of view, while at the same time he seeks to find the cheapest tender from his client's point of view and invariably either the price must be changed, or the design must be changed. I feel from the country's point of view, the amount of money that is being wasted by calling tenders in this form is apalling. Referring to Mr Brown's suggestion of "in house" design, I think

that idea could be carried out in the same way with Government bodies calling the tenders, on the basis of preparing the specification themselves or allowing an outside consultant to do this and then calling tenders on a fixed design. This will ultimately give a better price and a better job.

REPLY - MR K. BROWN

In the small ships area of Navy Office, we've learnt some hard lessons over the last five years. Unfortunately, we have even put firms out of business because we indulged in design and build contracts. Because the firm had to do the designing, it meant that the definition of the requirements was not as clear as it should have been which lead to complications in tendering. Most builders are not designers, they engage sub-contractors and we can only comment on who they choose, we can't say who they must use. So our policy now, as much as we can apply it, is to either design "in house" (and, of course, we have got our limitations) or enter into a design contract with a private firm and then to have a separate build contract. This is much more manageable and it is, I feel, better for all concerned. For example, we have just designed "in house" a 12m workboat, which has a personnel version and a diving boat version. It is a little complex for a 12 m boat, and to design this and define this fully, we have produced full working drawings. We have produced with great effort, 54 hull drawings, 28 mechanical drawings and 9 electrical drawings and a very comprehensive specification. We have had to th this because we have found that tenderers can be people who have never built a boat before. We have been so involved in trying to teach people how to build boats and put contracts back on the rails and stop people going out of business, we have decided it is better to do all this work beforehand than to try and straighten it out afterwards. We hope that the whole situation will be very much improved by this initial extra effort which, in the long term, should involve less expense and effort.

COMMENT - MR CLARKE (Department of Transport, Shipbuilding Division)

Mr Boden's comment about "design and construct" tendering is of interest, because in the recent experience of the Shipbuilding Division, there has been a trend by commercial shipowners to request tenders on a "design and construct" basis. For this reason, if they get a design from a single consultant and the design is hard and fast (including comprehensive drawings and a tight specification) he is not able to explore possible different designs which may be better suited to his operational requirements, contain some bright idea that he's never thought of. Some commercial shipowners are therefore attracted to "design and construct" contracts and ths Ship Construction Bounty Act allows that to be done.

COMMENT - MR K. BROWN

I think that an important aspect to remember is that the technology in engineering, including the marine side, is advancing rapidly and that the technical solution of a requirement is a thing that needs to be looked at more professionally. Alternatives have to be explored and a final solution needs to be justified fully by properly documented analysis. This can be done by competition by various shipbuilders and separating the design pahse from the

construction phase, or by a consultant to show the alternatives that he's looked at, or "in-house" by Defence. We are obligated to prove to the people who spend the money that we've come up with the best solution to the problem. There must be this competition and proof of professional effort that's gone into the solution to the problem.

COMMENT - MR TAIT (Bureau Veritas)

I would like to make a comment about two papers. Firstly, I am pleased to note that Mr Brown and his Department tend to use Australian Naval Architects. I think it's a most important feature that comes out in his paper, that research and development will be done within Australia. The second comment is about Mr Fry's and Captain Knight's paper - I would like to comment about the 5/8 Freeboard. This is something which originated in Europe and it is a very important factor in the operation of Trailer Hopper Barges. Perhaps Mr Fry has some comment about the cost savings to the dredging project that reduced Freeboard has in the operation of these dredgers. Another point I would like to make is that with the non-propelled type of dredger operating on the Australian coastline, which has such tremendous distances to travel, it's a major operation to ship all the bits and pieces of equipment to the ports which are being developed, particularly in northern parts of Australia, and on the West Coast, and even for short voyages. One of the features that is a recent development is that the major Classification Societies are endeavouring to assist Owners by wet dockings "on site" in the same way as large "Supertankers", fixed platforms and drilling rigs are being surveyed. This is being done by using television cameras underwater with expert divers in conjunction with specialist cleaning teams who can clean the bottom of the vessel so that a proper record can be taken of the ship's structure from an external point of view without having to actually see the vessel in dry dock. Perhaps Mr Fry would like to comment on those points.

REPLY - MR FRY

Those points are advantages in our favour, quite good advantages, but I am afraid I cannot give precise figures as to exactly how much the saving would be with regard to the 5/8 Freeboard, other than to say that for a vessel like the "Resolution" which has a depth of 7 metres you can load it to an extra .6 metre in draft, this is giving quite a considerable increase in deadweight. This does have a slight disadvantage in that every year, the vessel has to be docked and a survey carried out on behalf of the Department of Trade and Industry, who nominate or request a Classification Surveyor in Australia to do the survey So we are up for an additional docking and this falls due with the normal Freeboard survey or three months either side of it. This only applies, incidentally, to British ships registered in the U.K. which our ships are. The wet dockings, which the Classification Societies have now given their sanction to, will also greatly help us, particularly in the case of stationary vessels which are not always in the vicinity of a dock, and in the case of the West Coast of Australia, may have to be towed down to Fremantle, which interrupts a contract which may have only been started. You have to interrupt

the contract and have the vessel towed down, leaving the other plant idle, and this is, of course, a great cost. So this proposal - doing a wet docking at the time of interim docking - will certainly be a great advantage to us.

QUESTION - MR ELLIS (Consultant)

I'd like to get Mr Roger's views on a non-technical matter concerning Australia in the form of cheaper imports which caused the canneries in Australia to be over-stocked early in the season and thus limiting what promised to be a good season. This year, Tuna prices paid by the fishermen are down by about $20 a ton and operating, building and repair costs, have increased considerably. In New South Wales, a payment of compulsory Workers Compensation at its present rate imposes a further substantial financial burden on the fisherman. I am informed that on 1 January 1975, these rates were increased by 15% and on 9 May a further increase of 50% was imposed. The owner of an average sized Tuna Boat is now faced with the Workers Compensation Insurance Premium of some $7,000 per annum and normal insurance cover for his boat of about $3,000. A number of insurance companies have stated that analysis of claim history discloses the fact that claims on Workers Compensation Insurance in the fishing industry over a period of 10 years have been negligible. Boat owners are considering abandoning Tuna fishing and engaging in trawling, where less men would be employed, or moving their operations to a State where the rates are considerably lower. In view of the effect this would have on Naval Architects and the small shipbuilding industry, serious consideration should be given by Governments to relating premiums payable in the case of the fishing industry for factual claims history. Could I have your commonts on that, please?

REPLY - MR ROGERS

It is very difficult for me to make any comment with respect to insurance for vessels and workers compensation. As far as the Tuna industry is concerned you may be aware that certain limitations have been placed on the vessels that can now operate in certain areas within the Tuna industry and specifically Purse Seining. I think there are only 6 Purse Seining vessels allowed within the designated zones, which stretches somewhere from the Queensland coast and the East coast of Bass Strait, then from the South Australian Border to about half way across the Australian Bight. The problem here, of course, is that the fluctuation of catch at any Fishery is very difficult to predict. There is a great deal of research being developed in this area - i.e. in regard to population studies of fish. There are States operating fisheries research vessels having a look at these problems including the development of new grounds so that fishermen may effect change from one fish variety to another. The restriction of the number of Purse Seining vessels in the Tuna fishing industry does allow more exploitation by the Pole Fishermen. This aspect is being looked at closely all the time by State and Australian Government Fisheries Committees, and I can assure you that the interests of the fisherman are always to the fore. It is very difficult to comment on the Tuna season this year, as it has barely started.

COMMENT - MR MISTREE (University of N.S.W.)

My question is directed to Mr Rogers. In his conclusion he says - "To change a fishing vessel you must change the nature ot its Master. Such a process requires education and training both of which may inadvertently have undesirable side effects." I would like amplification of this, as I find it a bit difficult to appreciate the wort of undesirable side effects that occur with trained and educated personnel.

REPLY - MR ROGERS

I was hoping that the answer to that question was so obvious, that I would not have to state it either in the paper or at any other time. The conditions under which fishermen operate for most of the year are not comfortable - it's a fairly hazardous life at the best of times. One of the great problems that usually develops in Maritime Education Training is that the better qualified the personnel, the better conditions are expected. I wonder on that account alone whether the Australian Fishing Industry either wants or could stand it! There are, of course, other desirable side effects that lead to a more developed industry, but I think that our industry as it stand at the moment which is largely owner-operated, relys on a psychic approach (if you like), a way of life; and if you start changing this, it is very difficult to predict whether the industry will in fact benefit from it.

COMMENT - MR HELMORE (Eden, N.S.W.)

The last couple of years I have spent working on differant types of fishing boats around the coast and I am currently on a Tuna Boat, and, as Mr Rogers said, we have just started the season and we are getting into it very slowly.

Firstly, I would like to compliment Mr Rogers on his paper and the work and trouble he has gone to in collating the information in those tables. It is the first time I have seen that sort of information gathered together in any one place on Australian Fishing Boats, and I think it's very well worthwhile. I would like to comment on and add to some of those tables.

In Table 4 on the Danish Seiners you make the note that some of these vessels double as Tuna Hold Boats during the early summer. This practice appears to be on the way out at the moment, because the Tuna are now being found further off the coast than 5-10 years ago when they were often found inshore, well inside the Continental Shelf. Danish Seiners invariably use ice for refrigeration and the full time pole boats with their brine refrigeration are taking over.

In Table 4 dealing with Gear, you make a comment that there are 7 coils of hard laid manila or synthetic rope on either side. Manila is never used now and - I can only speak now for Eden - this is simply because of the high cost of manila rope and its short life. Manila rope had to be replaced 2-3 times per year and 4 times if the skipper really worked his gear hard. At last costing (before synthetic ropes came in) manila ropes were $131 a coil, meaning of the order of $5,500 a year. Lead cord polypropylene ropes came in about 15 months ago and they appear to have saved

a lot of Danish Seiners from going out of business. They've simply got a longer life - some synthetic ropes have been in service for 15-16 months and now owners are confidently expecting 18 months to 2 years of life. The initial cost is higher, at $250 a coil, but replacing every 18 months- years means a yearly cost of only $2,000 which is of the order of 40% of the cost of manila ropes. I also make the point that manila ropes wear out - fraying and general wear and tear - whereas synthetic ropes simply wear down all the way round.

In Table 6, on Tuna Pole Boats, Mr Rogers has listed under 'a' - Sonar. To my knowledge, there is only one tuna pole boat with Sonar fitted, and that was fitted at the beginning of this season - as a matter of fact, on the boat I'm working - and there are no others in operation. However, I would also add, under Aids, that there are automatic pilot, radar and thermograph - which is an instrument for recording water temperature and which is standard on all the full-time Tuna Boats. Radio direction finding equipment is now coming into widespread use, due to the large distances being worked offshore by the full-time boats - last year we worked distances of up to 1800 miles at sea. If you are fishing that far offshore, you spend the night at sea and might drift 20-30 miles during the night. If the plane spots fish the next morning he'll want to know where you are so you can get to the fish first.

On "General Remarks", again on Tuna Boats I made the same point that very few Danish Seiners or any other type of boats are now converting to refrigeration. Last year in Eden there was only one Danish Seiner converted and one Salmon Boat.

REPLY - MR ROGERS

I was in fact aware that there was only one tuna poling vessel using Sonar. We have been doing a great deal over the last two years to encourage people to use Sonar.

The Australian fishing industry has got a history of innovation and I often look upon this as having undesirable side effects when one considers whether some of the innovations in fishing gear technology in Australia would, in fact, develop the way they have. An example comes to mind - the development of the Scallop Dredging which is largely Australian.. I think that one of the problems of regimented education and training particularly as most of it is geared towards the seamen's requirements of certificates of competency is that it tends to remove some of this initiative from the operator.

QUESTION - MR MISTREE (University of N.S.W.)

What sort of feed back does the University need to have as far as changing the Education system is concerned? Basically, there is a lot of development which has come about because of the necessity being there for that particular development. However, by the same token, if a person is trained, then the development may be much more, it may be an ordered development. Probably, what needs to be done here is to define what sort of requirements the industry

has rather than say that there are bad effects of somebody going to the University or otherwise trained. I think this approach is a short-sighted policy.

ANSWER - MR ROGERS

Unfortunately, with the development of training, attitudes change and this means change of conditions and a number of other factors. I might also point out that the fishing industry is extremely concerned with the development of the Australian Maritime College and my Department will certainly be making every effort to ensure that there is provision made for people within the fishing industry to enter that college at all levels - this is to the upper tertiary level and down to the lower certificate level. We also hope that the Certificate of Competency would be enveloped within the general educational framework of the College. I would agree that if Australia is going to develop its industry, then people have to be trained and educated to operate the larger vessels with the more sophisticated gear required on long ranging voyages. What I am saying is that there are some undesirable side effects, not advocating that we shouldn't have it.

QUESTION - MR ELLIS (Consultant)

Is any consideration being given by the Australian Government to extend the coastal limits of the fishing industry in Australia?

REPLY - MR ROGERS

This matter is under consideration by the Law of the Sea Conference. The Australian view was that this limit should be extended to 200 miles.

COMMENT - MR CLARKE (Dept. of Transport, Shipbuilding Division)

May I thank Mr Hackworth for his most interesting paper and it's very good for us all to look to the history for the effect on the future River Murray trade. Perhaps it is a pity that the Darling is not running radially inwards to Sydney and the Murray is not running radially inwards to Melbourne! I think he is a little optimistic about his predictions of trade, especially considering the inconvenient double handling that would occur from river transport to rail to go to the cities. Has he considered this? Do his figures take account of that? Could I just say, too, that as he probably knows, a significant vessel has recently been built for the River Murray for another aspect of it, that is the tourist traffic and that appears to be rather successful and I believe a sister ship is contemplated.

REPLY - MR HACKWORTH

Increase in trade appears a bit difficult to justify at first, but going back to the spheres of influence, the trade on the Darling at present tends to go to South Australia and river traffic would naturally accentuate that, by taking trade down the river into the Murray. In the final part of my paper I recommend that there should be a simple port of relatively cheap construction at the Murray mouth for handling such barge traffic. This would get away from

the expensive railing from Bourke or Menindee to Sydney or from Broken Hill to South Australia. The Murray trade is very well served by the railways of Victoria as is the Murrumbidgee area, however, Victorian freight rates are generally incredibly expensive in comparison to, say, South Australia.

The Murray trade used to be taken right down the river and then transshipped often from Morgan or from Murray Bridge on the lower Murray. When the Victorian railways brought in very heavy concession freight rates, this favoured trade to Melbourne, rather than going down to South Australia through Adelaide. This ruined the building of a port at the Murray mouth which was going to be undertaken early this century. To answer a question I had hoped would be asked, that is, if we are ever going to have river trade again, we must have a port at the Murray mouth - it is as simple as that!

QUESTION - MR CAMPBELL (Riverside Tug and Barge, Brisbane)

I wonder if the speaker has thought about the economics of barging? The wage structure and business structure - double time, etc. - is costing industry so much money that it is becoming uneconomical.

There has to be some re-thinking by individuals and different groups of people in their attitude to work and to industry.

MR HACKWORTH

The costing aspect was assessed on a 10 hour a day crewing operating 6 days a week. The payment of penalty rates has also been taken into account.

The whole analysis considered, the operation of the barges or steamers privately owned by a group of people or small corporations, of, say, land holders along the rivers.

COMMENT - MR ARMSTEAD (Maritime Services Board, Sydney)

I would like to support the remarks Mr Clarke made about Mr Hackworth's paper and make a few comments which may be of some interest.

The Maritime Services Board are responsible for the administration of inland waters and the navigation of these waters - up to a point, and once had personnel who had the title of Harbour Master Inland Ports - the port of Bourke, the port of Menindee and so forth. You will notice on page 23 of the first paper there is a reference to the River Murray Traffic Regulations and the Harbour Master Inland Ports was our representative on that.

There is an increase in the amount of traffic related to pleasure boating in this area, particularly hire craft (paddle wheel propeller, drive yourself house boats). There are a number at the present time and these would impede the operation of barge traffic.

With regard to regulations, we also have the complication of the various larger paddle-wheeled vessels, which operate in South Australia as well as in N.S.W. and which are therefore engaged in interstate trading and are therefore subject to the Rules and Regulations of the Australian Depart ent of Transport.

COMMENT - MR WESTHORP (Department of Defence (Navy))

I would like to comment on two papers, firstly on the fishing vessels - page 54, 2nd paragraph - referring to currency devaluation being the only positive remedy that a Government can actively effect for export sales. I suggest that the integrated effect of these export sales would be to bring down the price of produce. Since the price of the fishing boat is very largely the main factor in the price of the produce, might I suggest that if the Government were to move through its own agencies to provide tax relief for fishermen, a subsidy for the building of fishing vessels, better financial facilities for the purchase of new vessels by way of a more easily obtainable loan, longer term repayments of the interest on those loans and the capital, then the fishing industry may be in a better position to bring down the prices of products, and so to enter into the export market.

On the subject of dredging, I noticed that the paper deals only with those dredgers which are used in port and harbour works. At one stage in my career, I was engaged in the building of dredgers used in mineral recovery - there are a large number of these recovery dredgers, not very big, used for sand recovery, for tin and for gold, and these were, some 20 years ago, quite a sizeable export - to places such as Malaya and Borneo. I wonder whether the authors of this paper might extend their remarks to cover this.

COMMENT - MR ROGERS

I feel the implications of this question don't necessarily relate to exports - what you are really suggesting is reducing the price of the product right through, both on the domestic market and on the overseas market. I don't think I can really agree - the problem of the Australian fishing industry is not one of cost of product in that sense - the fishermen can catch the fish, but are getting very little for it - there is a consumer resistance problem that probably most people are aware of in Australia. Something in the order of 5½ kg. per head is the annual consumption in fish product, as compared with 100 kg. of wheat product. Half of the fish consumed is imported. When fishermen are getting as little as 4c./kg. for landed fish, it is surely unreasonable to expect them to reduce the cost of product very much more. We have a marketing problem and the Australian and State Governments are engaged in enquiring into all aspects of marketing and fishing and the Industries Assistance Commission is presently undertaking enquiries on all aspects of the Australian Fishing Industry.

In essence, I do not think that the answer is one of currency devaluation, or necessarily making it easier for the fisherman to purchase vessels - I think that the problem today is one of marketing and promotion.

COMMENT

In his paper, Mr Rogers said that if we 'educate' the fishermen, they would probably want better conditions. I don't see anything wrong with fishermen having a few better conditions. He also says that fishermen develop their skills by experience and/or by the direction and advice of their contemporaries without the need of outside direction and advice. I do not really believe this is true. There are alot of people in the industry who can give advice to fishermen and I believe they really seek it - particularly in the engineering side, the side of hydraulics, which is a reasonably new innovation on smaller vessels. However, there is no Department or organisation providing a general consultative advisory service. This is a problem in the training of fishermen for the industry.

ANSWER - MR ROGERS

I think 'conditions' have a broad definition and if we apply, for example, the conditions required by Merchant Seamen on merchant ships to Deck Hands on fishing vessels right away, then I think we would be presented with a number of problems! For example, consider specifically the amount of comfort on vessels. While the basic safety requirements in a number of areas, including accommodation, which are at present being studied by the P.M.A. must be met, I think that the problem arises as to whether any authority should, additionally, specify the degree of comfort on a vessel. With respect to advice, I have had a fair amount to do with the education and training of mariners for a number of years and it has been my experience that until you have the confidence of the average fisherman, it is very difficult to try and redirect his ways. This can be done by conducting seminars and other courses of this type, attended voluntarily. But if you mention conducting a course on a specific thing (or a piece of equipment) which all the vessels have, the sort of reaction one often gets is - "We have been using this equipment for a long time and we already know how to use it!". This is a very difficult bridge to cross - to convince any fisherman that he doesn't know just as much about the technological operation of his equipment as perhaps he should do!

QUESTION - MR GARTLIN (Lloyds Register of Shipping)

Has the Australian Government given any consideration to incentive to Australian fishing companies having larger boats operating outside of Australian territorial waters, such as up around New Guinea, in competition to where the Japanese have operated?

ANSWER - MR ROGERS

I am not aware of any direct incentives. I have mentioned that discussions are currently going on, and a committee has been set up to study the management of the Tuna fishing operations. Before we should encourage industry to move into deep sea fishing operations, we have to ensure a market for the product, and until we do that, I don't think any fisherman is going to venture into long-range fishing operations.

COMMENT - MR GARTLIN

Just to follow on that, my question was to compete with the imports coming into the country and possibly use a processing vessel.

REPLY - MR ROGERS

I think it comes down to the question of the number of vessels that can get a reasonable rate of return on investment in a particular fishing operation without the stocks being over-exploited or over-fished, and this is really a management problem. With respect to the use of processing vessels, it still gets back to the problem of selling the product. Unless you have got a market demand for your product, there is little point in trying to catch it. I think it's very difficult - in fact practically impossible - to divorce the primary from the secondary sector of the industry and it gets back, once again, to the problem of marketing and promotion to increase the domestic consumption of fish products in Australia.

WRITTEN CONTRIBUTION - R. JAMES

The South Australian small ship building scene does not present a very happy picture at the present time because of the dependence upon the fishing industry. The demand for new vessels has been curtailed by the present inflationary situation, the false hopes raised by the Government Subsidy scheme and the restrictions imposed by the State Government.

Three ship yards have closed down since 1972 and many highly skilled people are vacating the industry. I will be doing this very soon if there is no improvement.

FINANCIAL BASIS FOR A SMALL SHIP INDUSTRY IN AUSTRALIA

CO-ORDINATOR : DR J.H. TAPLIN

Bureau of Transport Economics

As I am not a member of this particular club, let me introduce myself. I am John Taplin, Director of the Bureau of Transport Economics, which I presume was justification for inviting me to chair a session on the financial basis for a small ship industry in Australia. I am not a financier but an economist and I suppose there is some connection between the two. Before introducing the speakers, perhaps I could say a few brief words. While listening to the previous session and going over the list of people here, I thought we are mostly bureaucrats or similar sorts of people who get a pay cheque regularly every fortnight.

I come from agriculture and, in fact, was a farmer for many years. I was therefore gratified to hear after a while, one or two fishing operators speaking up. The different approaches, I think, always stand out a mile at this sort of discussion.

There is a world of difference between the man who has to work hard to ensure income for the next period, which he does not have to do with an assured rate of pay. He has all sorts of problems, such as trying to match his debts and his commitments and his outgoing expenses against his income. Those assembled who represent the small ship industry should worry very seriously about the people at the end - the operators - and I suppose this also goes for small shipbuilders. But the main need of the industry - any industry, in my view - is the satisfaction of the people right out there at the work face who actually have to make the thing work.

The speakers probably need less instruction to you than to me. Mr Rogers whom you already heard in the last session is standing in for Mr Sturman and I am sure he is well able to cope with questions, comments and so forth on that paper. Next is Mr Glover and I understand he needs no introduction whatever to most of the people here. Next is Mr Chidgey who has prepared a paper on the financial aspects - I was particularly interested in what he had to say about gearing ratios and these aspects. Finally we have Mr Sheppard with his paper on Government assistance for small ship construction. Following the procedure of the last session, I will now throw the matter open and call for comment from the floor.

COMMENT - MR CAMPBELL (Riverside Tug and Barge, Brisbane)

In Mr Chidgey's paper on the second page he talks about company tax. The present taxing rate on companies is around 45% which was reduced by Mr Whitlam by 2½% which was very welcome. However, for private companies the undistributed profits are again taxed at 50% and the individual taxpayer pays tax again. Very little money is therefore left for reinvestment, replacement of funds, especially with the rate of inflation, making for an impossible situation. In the company I operate we have about 26

tugs and lighters. We have tug boats built in 1912 - the "Palina" has two boilers and two diesel engines, and had new plates, stringers etc., and is uneconomic - it is silly, but how do we replace it? You see this in industry today everywhere you look. You see it on the land. I was at a shearing shed the other day, and I know the wool industry has been in a bad time of late, but they cannot now replace equipment. They need hundreds of thousands of dollars to replace equipment. This is happening everywhere you look in industry. Something has to be done about it and the only thing I can suggest is that if those with influence could induce the Government to look after industry on the tax side, it would be very much appreciated.

COMMENT - MR D. DALY (J. Burke Pty Ltd.)

I would like to add to that. I sympathise with the plight of Mr Campbell in respect of tax, particularly in undistributed profit tax. Perhaps if you are fortunate to be in a position to have to pay this tax in itself, it indicates at least that your business is profitable, because undistributed profit tax results from the profits made by the company in the year which are ploughed back into the company and not paid out as dividend to the shareholder.

I think this arose originally because in some private companies which were extremely profitable, money could be ploughed back into the company and it never came up for revenue collection, so that you had earned income in a company which had not been taxed. We have perhaps something of an enigma today - and I believe it is under close attention by the Tax Commissioner - where a private company must distribute a percentage of its dividend otherwise the undistributed profits become taxable in the company. This further detracts from the cash available to operate the company.

I would draw attention to the fact that this applies only to a private company, and not to a public company. Taxation is probably the biggest ongoing expense which any business has to meet, so as such it is a very important factor when one comes to looking at the cash flow and the operation of a business, and requires very special consideration. It may well be that if assistance should be extended to any particular industry in a community, that taxation relief is one way in which assistance can be given. This is done in other countries, but I do not think it is done to such an extent in Australia as perhaps it has been done in more developed countries. The Americans, for instance, have given particular attention to this type of assistance to small businesses and I think, in raising this question of the undistributed profit tax, we are raising the broader issue of the small company with private equity funds which is subject to tax on a parity rate.

You might even compare benefits which might arise from tax relief to shipbuilders, for instance, with the benefits that they might accrue from subsidies of various kinds, particularly the bounty. If you get a net cash payment as a benefit in capital cost then you have a unit improvement in cash because you have that much cash injected into the company, but that is the end of it. As far as the subsidised ship is concerned, you have an improvement, the capital cost has been reduced. But as far as the overall life

of that vessel is concerned, and all the people who are concerned with its economics, you only have one net improvement. So if you draw the sensitivity curve for the construction and operation of the vessel you find it is much less sensitive to increases or decreases in capital costs than if the sensitivity curve was drawn for, say, a reduction in payments of tax across the life of the operation of that vessel. Special consideration therefore needs to be given when looking at pieces of equipment which are manufactured and depreciated in operations of a ship, particularly when you are trying to extend to the whole infrastructure surrounding operating that vessel to give some incentive to make the whole of that industry more economic.

QUESTION - MR S.P. SMITH (Department of Transport)

Let me say that I and my Department would also be delighted if assistance schemes in the present bounty arrangements were implemented. I would just say that the Government has already moved to avoid delays by minimising Departmental involvement in affairs of builders and owners by eliminating the necessity for the Government to be involved contracturally in the building of subsidised ships. This is an important aspect of the Ship Construction Bounty Act in that the contractual arrangements are now entered into between the builder and the owner - there is no longer a contractual involvement by the Commonwealth.

One important aspect of the Government's assistance arrangement is, of course, the control exercised over the importation of ships and it is on this point that Mr Glover's paper is silent. Without going into detail, it is probably sufficient to say that the present import arrangements are administered in the interests of both the owner and the builder. On the one hand, the system ensures that all Australian yards are given the opportunity to tender for subsidised ships and on the other hand the owner is in a position to obtain a ship at world prices. On page 13 of Mr Glover's paper, however, he refers to the need for a free enterprise approach which is competitive for the shipbuilding industry to survive. I should like to ask how Mr Glover sees his scheme fitting with existing Government policy in relation to the importation of ships which is not, of course, covered by the Ship Construction Bounty Act, and how Mr Glover is proposing an alternative scheme to be arranged in the Act.

I would emphasise that the import policy arrangements are not spelled out in the Ship Construction Bounty Act. In elaborating on that general question, is Mr Glover advocating departure from the present policy to enable owners to negotiate with overseas builders without necessarily approaching Australian Shipbuilders? If this is what is intended, it would, of course, have serious consequences for the shipbuilding industry. Alternatively, does the proposed scheme restrict the owner to negotiate only with Australian builders thus eliminating any element of foreign competition. In that event of course, the interests of shipowners would not seem to have been considered.

Juse one other point on a different subject. On page 19, the paper proposes payment of the Ship Construction Bounty to a shipowner constructing a new vessel, while as you are no doubt aware the Bounty is available for the assistance of the shipbuilding industry. Under Bounty Act legislation, the bounty must be paid to the manufacturer who it is intended should get the benefit - I think in fact the Constitution provides that bounty payments may be made only to the manufacturer. Perhaps Mr Glover could explain how it is proposed to pay bounty to the owner, when this is contrary to general principle.

ANSWER - MR L.B. GLOVER (L.B. Glover & Associates)

I will endeavour to answer that question. But first of all there are a few questions which I would like to answer. During the previous session, Mr Boden referred to the current trend to seek tenders on a design and construction basis as being a very bad policy and one which will be costly. On the other hand, Mr Clarke appeared to me to defend the practice on the basis that a design and build enquiry encouraged owners today to obtain a wider scope of designs and pick up ideas and possibly by such better competition get lower prices. I support Mr Boden's viewpoint. A U.K. or a Japanese shipowner has no trouble at all in obtaining a well designed ship at a very competitive tender price or negotiated price, because its shipowner has freedom from Government intervention and no need to go out on a Government supervised public tendering arrangement.

The tender system is the worst feature of the Australian shipbuilding industry today and adds tremendous cost to this industry. It breeds discontent, distrust and adds excessive costs to all sections of the Shipbuilding industry. The present trend to go out on a design and construct basis flows from the Bounty Act and is a relatively new innovation but one which is being encouraged. As foreign designs cannot be subsidised, ASB designers will no longer accept responsibility for their designs and Owners doubt the financial ability of local designers to meet the costs of rectifying design faults or deficiencies, they therefore have to prepare a contract with the shipbuilder to take the responsibility of rectifying design faults, and the shipbuilder is responsible for engaging the designer.

As Owners do not wish to carry the costs or responsibility for going out to public tender (and I stress public tender) on their own design, what is the answer? Cut out tendering, allow owners freedom to go from builder to builder and negotiate the construction of a ship direct without Government interference. The owner and the builder and the naval architect can reach a very satisfactory settlement without intervention of public servants in this field. There is no doubt that the resulting ship will be better technically and will meet the owner's operational needs and will be considerably cheaper in construction costs and in costs of time saved particularly in his own cash flow problems. The present system of administering the shipbuilding industry with Government assistance stifles credit flow into the shipbuilding industry.

Next, I would like to say I think Mr Campbell is right also. All the technical know how and planning of experts is worthless

unless there is a shipowner to pick up the cheque. That is, a shipowner must be able to afford the cost of the new ship and the cost of the ship must fit in within his economic study of operation as some customer eventually has to pick up the freight tab. The aim must be to seek out ways and means to cut down the cost of Australian built ships and if Government and civil service activities add to this cost, it must be examined and curbed or cut out.

I believe that the Shipbuilding industry should "pull its finger out" and not pussy foot about accepting things tc freely because I have never found any trouble in my dealings with public servants. We have our differences of opinion, however these are invariably settled amicably. I believe that they accept the challenge of argument and my paper was put forward on that line.

Now, Mr Smith raised a number of questions. He said the Government is going a long way now to getting out of the shipbuilding activity-by no longer contracting under the old Australian shipbuilding scheme of Section 47 of the Australian Coastal Shipping Commission Act., where the Australian Shipbuilding Board contracted to build a ship and then contracted to sell the ship. I say the reason they got out was to get out from under, that is to get out of the troubles they caused themselves by being contracting parties to both builder and owner. The industry also suffered therein because the Shipbuilding Division was a screen which owner and builder hid behind and threw stones at each other.

Mr Smith also asked what my views were on foregin ships coming in and so forth. My paper is concerned with administrative problems, not making Government policy, Whichever Government is in power, they make the policy and I have no intention to instruct Government in its policy. I consider the flaw in this industry is that while Government makes a policy at Ministerial level supported presumably by Cabinet, that policy changes many times over and in its final administered form differs substantially from the initial policy.

In his paper Mr Sheppard gives statistics on Government subsidies and includes as an appendix a summary of the Bounty Act. Page III-33 of the Act states that tenders may be called either by the Owner or the Shipbuilding Division. If tenders are called by the Shipbuilding Division, it is extremely difficult for the shipowner to find out who has tendered or who is tendering on your project or to discuss tendering matters directly with the shipyards. If you go out on a design and construct basis and try to talk to a shipbuilder or his designer, it is most difficult, because the builder somehow feels that this cuts out the validity of public tendering. I therefore believe that the public tendering is the worst feature.

In relation to overseas policy, I consider that is a Government matter. I am essentially interested in the administration of Government's policy for shipbuilding assistance by way of bounty.

QUESTION - MR A.K. McQUIRK (C.P. Marine)

I'd like to direct this question at Mr Chidgey. The system

that operates in the United Stated on tax relief for fishing vessels, called the Tax Reserve Fund, goes on any U.S. system or company who owns the leases of fishing vessels, may enter into an agreement with the Secretary of Commerce whereby tax free deposits may be accumulated for the purpose of replacing a vessel or purchasing additional vessels. The agreement will establish the volume frequency and title deposits and for the purpose for which the titles will be used the deposits may include any proceeds from the sale of a vessel, insurance paid, depreciation and dividends. This goes into an account that you can draw on, for replacing gear or a new boat without having to pay tax on it. If the money is drawn out without any use to fishing vessels then the tax due plus interest must be paid. Could a system like this be introduced in Australia?

ANSWER - MR CHIDGEY

I am probably not the right person to answer that question. It would be much better considered by the Department concerned who I am sure have considered the matter, or the Department of Taxation.

The fact that tax is an ongoing expense to the operator of a vessel is a significant fact or and if you consider the time value in any scheme such as this, you must also consider the need to escalate in some way or other the fund which you are creating. For instance, if in year (1), you deposited a tax free amount of $100 to use in year (15), your $100 would have depreciated significantly. If you are able to charge that out in your company as a depreciation amount and not pay tax on it in year (1) as is the case in Australia then you would have an earning capacity of 7% or 8% or 9%, whatever the turning rate in your particular company was. So if such a fund is created and it is going to be of benefit to the shipowner (and eventually to the shipbuilder) then that fund would have to have some way of accruing interest or accruing or maintaining its time value in an inflationary society.

You see, we are now living in a slightly different society to that in which we lived in the last decade. Perhaps in monetary terms the most noticable difference is inflation and we have not yet learnt to deal with this problem which is very significant factor. So any sum of money which is put aside for use in the future must take account of its time value. I think that if you were able to establish such a fund as the Americans and other countries have operating, it might be worthwhile to bring it up to date by giving serious consideration to the time value of the money in that fund too.

COMMENT - MR E.S. CLARKE (Dept. of Transport, Shipbuilding Division)

Mr Chairman, in answer to Mr Glover's question, I would like to make some comments on his suggested system and you will notice that Mr Smith and I are miles apart so there is absolutely no collaboration in this. We all know Mr Glover, and his energy and enthusiasm. We enjoyed his paper which was written in typically forthright fashion and I might say that his criticism of the present system is of considerable interest and the proposals have been studied by many people seriously - people who are concerned with the administration of the shipbuilding bounty scheme.

With Mr Glover's earlier experience as Secretary of the Shipbuilding Board and in the Shipbuilding Division we might expect him to have a fairly well informed view on the system and perhaps it is a pity he did not give us the benefit of his thoughts a year ago when it might have been more timely.

May I say that the Government is aware of the need for a bounty system which has the following characteristics, not necessarily in order of importance or priority;-

- It should require the minimum of manpower to operate
- it should be published and able to be checked by owners and builders,
- it should be equitable as between ship types,
- it must be consistent with the shipbuilding assistance policy as has been announced.
- It should simplify owner/builder relationships as Mr Glover has already said,
- it should afford an adequate protection to the taxpayer's money.

The last aspect is, I think, one that we tend to lose sight of. To that end, as I think several people know, an investigation is nearing completion into all vessels below 2000 tons gross construction tonnage to find a suitable relationship between the physical parameters and the price. It is expected that from this investigation a method will be developed which will enable owners or builders to calculate the bounty payable on a vessel irrespective of tenders being called, which is roughly what Mr Glover's proposal aims to do. Undoubtedly, it would need a periodic review, say every year, to take account of the actual as against predicted escalation (a most important part of the thing) and also, hopefully, improved productivity. We do hope that a useful result will come out of that.

The essence of Mr Glover's proposal for an assistance scheme is that the bounty should be a function of the light ship displacement vessel and I would like to ask him if he could discuss the evidence that he has that this criteria is a reliable indicator of costs and that it will yield amounts of bounty consistent with current shipbuilding assistance policy. This question relates particularly to the great variety of small ships, many of which he lumped together on page III-20.

Another point I would like to ask him is that his paper refers to final bounty and a certificate of light ship displacement of the completed vessel including all modifications as providing the basis for final bounty. Could he please give me a comment on how this system would cope with costly modifications which might have a negligible or even a negative effect on displacement, for example, an extensive re-arrangement of accommodation? This can and does happen.

Finally, Mr Chairman, I would like to draw attention to paragraph three on page III-17. I must say firmly that that is wrong in fact. The Government has a legal obligation to pay bounty

if the conditions of the Shipbuilding Bounty Act are met.

ANSWER - MR L.B. GLOVER

There is a legal obligation under the Act, I agree, but the let out is that the Act provides so many "mays" and discretionary powers with which the Minister can refuse subsidy on in a number of areas. The Minister or his nominees have wide discretionary powers in so many clauses (there are too many to refer to) but if you read the Act handed out at the forum you will also see that the Act has obligations. However, the Minister has discretion under that Act, and he can use his discretionary powers and thus negate the obligations under the Act. That is the point I make in my suggestion that this be eliminated in a new Act.

Regarding the lightship displacement as the measure of subsidy, the reason why it takes so many public servants to run the Shipbuilding Division's activities is because you need policemen to police an insecure system. You have got two variables on which you base subsidy. One is gross construction tonnage. I can turn a swimming pool upside down and get some more gross construction tonnage if I'm running short just a little bit short of the next 2½%. So gross construction tonnage is something that can be adjusted, not necessarily to the betterment of the ship. If you are a fraction of a cubic metre from the next 2½%, you are going to adjust the size of the ship accordingly.

Then you have got the monetary side of the subsidy being based on the contract value and here is another variable in a most distrustful area. People can put their heads together and so to police this there is again need to have many public servants. Tendering also takes many people to run. A further lot of people are then required to see the ship is being built and so forth.

I maintain this is all unnecessary if you have the set sum of money allocated to a ship if it falls within a certain class, has a certain light ship displacement and that has an upward curve on every ten tonne of light ship displacement - I use ten tonnes as a round figure. I'm not a naval architect but within the framework of my proposals, architects can work out suitable levels for increasing subsidy appropriate to each class of ship. In my paper I propose six classes - It could be sixty, or it could be sixteen. The Department could determine in its studies how many classes may be necessary.

I am not saying this is a hard and fast scheme. It is the nucleus of a scheme which I suggest would be better than the existing one. The time saved would be anything from three to six months and with the escalation on the cost of ships today, the last six months of construction is most expensive and thus if you can save time in the construction, there is a substantial cost saving.

QUESTION - MR B. DOHERTY (Consultant)

I would like to address my remarks to Mr Glover. I would like to eompliment him on his paper. I think it contains things that have been very necessarily said. There is no doubt in my mind

that in the small ship industry the situation is not as good as it was a few years back. What has happened in the meantime to create this sadness is the fact that the small ship industry has been recognised by the Government and assisted by it.

In the early days of my business being set up, we did not have any assistance from the Government and we managed to get small ships built, by small shipyards that did not have all the paper work and frustration Mr Glover has referred to in his paper as being in existence today. The situation existed pre-1972 when a shipowner wanting a small ship could go to a shipyard which might have had a design he liked, or he could go through consultants and get tenders called for the ship for a design he had worked out with the consultants. These courses of action took a fraction of the time it now takes to get ships tendered for. Maybe the time/cost factor a few years back was not as important, but now, one and a half to two percent per month is what it is costing a shipowner in every month that his tender is delayed, which largely offsets a fair proportion of the subsidy that you are going to get anyway.

The situation has to be improved and I think Mr Glover is to be congratulated on putting forward some ideas on that subject. He did, in his paper, intimate on page III-15, that there were areas of taxation benefits which he believed, if applied, could provide greater assistance. I think he has done some pretty good work stirring this afternoon. Maybe it is unfair to broach the subject of direct taxation benefits but I think perhaps he might not have gone far enough. It is psychologically not good for an industry to be subsidised, and if the money that is going to go into a subsidy can be fed into the industry in some alternative effective way at the beginning, I think the dollar is going to go a lot further. I would like Mr Glover to give some indication of his idea of direct tax gains.

ANSWER - MR L. GLOVER

I think it is rather an intricate subject and you obviously have some views on direct taxation, but taxation law is a very flexible law which is constantly changing. It changes after Boards of Review and changes with changes of governments - all it takes is Parliament to pass a change in the Tax Act. It is as easy as that to achieve a change, but what needs to be put up to the Taxation Commissioner or the Treasurer are views of industry submitted by people who are being over burdened with the taxation. We don't pay excessive sales tax in shipbuilding but sales tax is paid and that could be cut out.

The States have taken over payroll tax and yet State governments provide finance in certain areas to establish industries or assist certain depressed industries. They could quite easily delete from payroll tax certain industries which have an impact in certain areas of employment.

In relation to duties ship components, I know the duty is there to protect the Australian supplier but as three quarters of the equipment from Australian suppliers originates to a great extent from overseas, I think the customs duty needs to be reviewed.

In relation to depreciation which is a taxation matter on ships, I think an owner should himself be entitled to declare what life he wants to depreciate a ship over - not necessarily fifteen or ten years, but he may even choose three years. When depreciation runs out, he has lost the benefit but it may suit his own company's financial means to depreciate that ship quickly. If he has lost that depreciation benefit it may cause him to build another ship later on to replace it.

I think also that there should be taxation concessions for improving equipment in shipyards. Some shipyards use manpower in marginal areas because there is no advantage in buying in more equipment and all that goes with it.

I consider depreciation in shipyard equipment could also be looked at and I think that a shipbuilding company should also be free to choose their depreciation time. All this will financially assist these companies which, however having made such decisions must then live with them. However I do feel this is too involved a subject to introduce into a shipbuilding symposium.

COMMENT - MR D. DALY (J. Burke Pty Ltd.)

I would like to comment on Mr Glover's reply. Very briefly, I think that what he is saying has a great deal of merit. It is in this area of taxation as I have already said that you can get continuing cash benefits to the total enterprise. Perhaps in the area of flexibility of taxation you could compare the shipbuilding industry with the mining industry. Very definite benefits can be accrued in the mining industry - For instance, a person building a new mine can, under certain circumstances, depreciate the whole of the capital cost of the mine plant in year one and this gives a great assistance to the cash flow of the mining company.

There are parallels which might be considered and if this meeting felt in due course they wanted seriously to take up the question of tax assistance perhaps they could in the first instance make some comparisons with the mining industry to see if there are any parallels or previous experiences that could be used as a basis.

QUESTION - MR J. LAVERICK (Carrington Slipways, Newcastle)

I would like to ask a few questions if I may. First, Mr Sheppard, I read with interest your paper on the presentation of subsidies paid. On page 29 (I am looking at the increased costs of tugs and supply vessels - staggering to say the least) I wondered whether you had, in fact, taken into consideration the increase in the specifications of these vessels as far as their requirements, increased horsepower, accommodation and other equipment was concerned, in calculating your increasing costs - the service supply budget changed quite a bit over that period.

ANSWER - MR W. SHEPPARD (Dept. of Transport, Shipbuilding Division)

(No - the figures are true of individual vessel costs and provide a rough measurement of increases in prices over the period. The comparison is made by relating particular vessel types of roughly

the same size but without regard to specific components). I think I do make the remark somewhere else that the tender prices are apt to vary markedly depending on the sophistication of the vessel concerned. That could well have a large bearing on the percentages that are given. They are only meant to be indicative.

QUESTION - MR J. LAVERICK (Carrington Slipways)

I would like to make a comment if I may, Mr Sheppard,on the subsidy arrangements on the Bounty Bill. It amazes me the number of people I discuss subsidy with who do not really understand it fully. I would like to make this point quite clear that the shipyards do not receive the subsidy. They receive no direct benefit whatsoever from the subsidy except for the fact that, as Mr Sheppard has pointed out, it encourages owners to build more vessels. Quite a few people come here with a smile on their face and they say "you get subsidy now". This is not the case - I would like to make that clear - but it has created more work for people and as one owner says it is a terrific system now - we buy four and we get one free.

The other point, if I may, I would like to address to Mr Glover. We do not have a design office of our own - we never have and we have no intention of doing so in the future. The reason is that we like to deal with all naval architects and consultants and hope they will bring projects they have in mind to us for development and eventual construction. This way if we get an enquiry we pass the enquiry off to various naval architects or consultants to investigate.

We have over a period of years developed a number of standardised designs and this is where the advantages of a design and build contract are apparent. We have a standard range of tugs and other vessels which we market. Standardisation, I think everyone will agree, has great advantages in cost reduction.

We are one of the organisations which pushed for modifications to be subsidised. To any shipbuilder they are undesirable and the shipowners can save themselves a lot of money by selecting what they want at the start rather than during the construction of the ship. While modifications during construction costs the shipowner a lot of money, they should in fact probably be twice as much as what he gets charged. It must be realised it costs the shipyard considerable delays in construction and consequently increased costs in getting plans drawn and that sort of thing.

On the other question of calling tenders, I agree with you. Calling tenders under the present system is not satisfactory. After fifteen years of enjoying dealing directly with shipowners it does cause a lot of problems but as it has been pointed out to me by the Department of Transport, you are spending public money therefore offer us an alternative. Mr Glover has and I believe the Department is also investigating alternatives.

The competition under free enterprise which you raise as well in your paper is that anyone who can build rolling stock or similar can readily get into shipbuilding. That is very good - I am a great believer in free enterprise and believe me the shipbuilding industry has plenty of competition already.

However, your established shipbuilder is at a great disadvantage because he knows what it actually costs to build ships, whereas organisations who have not built ships before submit low bids which give rise to the failure rate in our industry which is over the years second to none, particularly with the ones who start off without experience, I think it is similar to sub-contractors for the construction industry who do not realise the costs and in times of difficulty can always go back to other industries. But what about those who have large capital invested in shipbuilding? While these other people are in the industry taking these 'one off' jobs from the shipyards, what do the established yards do? What do you do with a shipyard if you do not build ships in it? - There are not many options open to you.

I like to see free enterprise but I feel there should be some sort of control whereby people in the industry have confidence to inject capital and know that the system is not going to be abused in other areas.

As a member of the Australian Shipbuilders' Association, I attended a meeting in the office of the Minister for Transport, Mr Jones, when I posed the question to a senior Department of Transport officer about direct negotiating between shipbuilders and owners (to reduce costs involved). It was stated that prior to calling tenders it was possible under the present Act for a shipowner to go to a shipyard and place an order, and that tenders could be called afterwards for pure purposes of evaluating subsidy. That is the advantage to the shipowner and the shipyard concerned but it is a great disadvantage to other shipyards. The Minister commented that while this is possible one had to be careful as other prices resulting from an official calling of tenders could affect the subsidy dramatically. It meant in effect that if somebody found out you already had made a deal, they may put a low price in just to alter the subsidy arrangements. This has not been put to the test yet and I would like to see a much better system.

There must be a better way of administering the policy so that people are not frustrated with delays which are involved under the present system. I believe the Department of Transport is making every effort possible to improve the system. The Minister has certainly, in my associations with him, been one for pushing this but he has got a lot of restrictions.

ANSWER - MR L. GLOVER

The system I have proposed is one that eliminates the need to have problems on low or high tenders. You have a lump sum bounty payment on a defined light ship displacement for the relevant standard class of ship which would be readily available - for example the modern equivalent of the "Liberty" ship, the "Freedom" ship for general cargo, or the A.N.L. Roll/on/Roll-off ship. If the owner wants a more sophisticated ship than the standard with more speed, equipment, etc., then he pays for it.

Because of the fixed lump sum for a fixed light ship displacement there is therefore no problem in policing it. You can go straight to a shipyard knowing full well what you are going to get and you

negotiate a price with the shipyard, you negotiate the design with him, you develop a standard design or whatever it may be and you negotiate a final contract price knowing full well what subsidy you are going to get. I think the benefit of this arrangement would offset the extra amount you may get on a percentage of a contract price bearing in mind that the contract price is subject to a lot of things in the Act which can reduce it.

QUESTION - F. MISTREE (University of N.S.W.)

Mr Glover refers to setting up a Bounty of fixed amount based on the displacement of a vessel. First of all, I suspect it is very difficult to define a standard vessel which performs a standard set of function. There are going to be grey areas where one type of ship may not just be satisfying one purpose but may be called upon to satisfy a number of requirements. I suspect it is possible to work something around that with experience.

The other point which I have not seen referred to in the paper is that there is inflation in this country and all over the world and if you are going to be stuck with a fixed lump sum then the cost of building it is going up, which may require some sort of indexation, this is another problem which I think would bear looking into.

ANSWER - MR L. GLOVER

It is not difficult to set a mean light ship displacement. It may not be entirely fair, but not difficult, and there is indexation in my scheme. There would be the Board of Review which advises the Minister. That Board of Review would constantly survey such things as inflation and changes in technology etc. and advise the Minister's staff what the next quarter or the next six months lump sum figure would be for light ship displacement rate.

COMMENT - MR R. HALLETT (Department of Transport)

I have been doing a bit of work on this matter as Mr Clarke said. We have considered Mr Glover's proposals, on which I have the following comment.

If you start out with something such as light ship displacement or something very simple at the beginning it is very difficult to generalise from that with regard to different ship types. For example, looking at some of the statistics, you can have a similar vessel of a similar type with a fairly similar light ship displacement and get up to 20% or so variation in the actual contract price. The question arises as to what just sort of accuracies owners want in a method that Mr Glover proposes? If you set your fixed rate of bounty at the beginning of the project you come up with something so that at the end of the job you may have received say 20% or 25% of the actual contract price in bounty. What we cannot do it seems, and I have had a very good look at most of the statistics, is that we cannot guarantee that you will get 25% exactly of the contract price in

bounty. I am asking Mr Glover what sort of tolerance level owners would be satisfied with? This tolerance level would probably vary, depending on how much input information you have on your estimate procedures. The more accuracy you want in your final bounty estimates, the more information you need at the beginning so these things have to be balanced up. I wonder if Mr Glover might be able to tell us a bit about what he thinks on this business of accuracy.

ANSWER - MR L. GLOVER

I believe the Government should consult more often in the technical areas to find out what the practical man is thinking, as against the academics and so forth.

I believe, number one, economists are measuring inflation. The Reserve Bank will possibly predict what inflation will be in a year's time. There is a reasonable indicator of the rate of inflation. I believe that in setting the quantum of subsidy on a light ship displacement basis for a period, you have got to say this ship is going to be built over a twelve months period so each quantum of subsidy that is your base rate takes into account a certain predicted increase - that is a quarterly or half-yearly review by this review committee advising the Minister on quantums to light ship displacement rates.

The simplest way to answer your question is why does not the Government ask the owners? Would they be happy with greater freedom and less supervision and activities in building a ship to achieve delivery of a ship six months quicker if they go around it in their own way. That alone is a tremendous saving in bounty and in costs to the owner and I suggest that an owner (and I've worked with a lot of them) would be happy for more freedom and accept a quantum of subsidy which would be renewed regularly - ask them and they will tell you. I am sure the answer will be yes, we will accept the scheme run by seven public servants and less restrictions and so forth. I do not think they are over concerned with the accuracy of things because even the present bounty scheme is not accurate.

QUESTION - MR REILLY (Consultant)

I would like to ask Mr Sheppard a question. Only a couple of days ago I found out we had a Shipbuilding Bounty Act! With this new Act, are we going to get any quicker decision on what the subsidy will be as opposed to what happened in the past?

In February I delivered to the Shipbuilding Board eight copies of tender documents, a cheque for $250 and asked that tenders be called. Tenders closed on 23 April and, as I recollect early in May the client indicated to the Department that he had chosen a particular builder and could he have subsidy? Subsidy was approved somewhere around mid-October which was six months after the tenders closed. This put me in a hell of a bind because at the end of May the client said to me "are we going to get subsidy or aren't we". I said "I think we are". He said "how much are we going to get?". I said "I don't know". Actually, he got more subsidy than I had estimated. But before subsidy was approved and

on Mr Daly's escalation rate of 2% per month, had we have watched everything, waited and been conservative, the price would have gone up 12%, on which the owner would have been paying 9% and the Australian Government for whom we have been trying to save money would have had to find an extra 3%.

ANSWER - MR W. SHEPPARD (Dept. of Transport, Shipbuilding Division)

I must say, with respect, that the question is not really within the terms of reference of the paper that I wrote to this symposium. However, you would probably appreciate that most Acts of Parliament provide the delegations inbuilt within that Shipbuilding Bounty Act. It is hoped that as many as possible will be obtained to make the processing of bounty a lot quicker.

It might be borne in mind that this is really becoming accentuated since June 1972 because, prior to that only big ships were involved and when the whole process took years. Some contracts were not even executed until a day before the ship was delivered and you had this sort of crazy kind of situation arising. The situation has become aggravated with the small ships being involved, and with the shorter building periods we now even get cases of contracts signed after the ship is delivered. While it is not in my particular area, it is hoped there will be delegations from the Minister which will speed approvals up.

QUESTION - MR T. WARN (Fisherman)

On Mr Sturman's paper, under problems of investment, he lists changes in environmental factors as an aspect which may affect the availability of fish to a significant degree (as in the case of the southern blue fin tuna and the banana prawn fisheries). On behalf of the fishermen, I would like to ask Mr Rogers if he could elaborate on the environmental factors which have affected or still are affecting the blue fin tuna industry.

ANSWER - MR ROGERS

I don't have my crystal ball in front of me to know what exactly Mr Sturman meant when he used the term "environmental" factors, byt think what he is really talking about is that - in the case of an open fishery or a licensed limited fishery, there often reaches a stage through technological change (and in case of the tuna fishing industry the introduction of purse seine) which technological change can have a drastic impact on that fishery. As a result of that change, management measures have to be introduced to retain the viability of that fishery and also ensure that it is not over exploited. There are a number of other examples of course of what one might refer to as environmental impacts using this in a very broad sense. The case of the introduction of measurement of mercury levels in 1971 in the shark fishery resulted in the Shark Fishermen's Rehabilitation Scheme being introduced to find other fisheries for people in that industry. As far as the northern prawn fishery, of course, this is constantly under review. There were some proposals to have licence limitations in the gulf fishery but that has not come to fruition yet.

COMMENT FROM FLOOR

.... Could you comment on environmental factors such as changes in water temperatures, etc.?

ANSWER - MR ROGERS

Well, I think there are a number of such aspects which can cause variations in the catch effort on an annual basis. I don't think that this is necessarily a management reason to introduce say licence limitation for an open fishery. What does happen, of course, is that if the biologists determine that the maximum sustainable yield of the fishery has been reached with the resources being depleted, then for biological reasons which you may say have an environmental cause - a licence limitation has to be introduced. This has many ramifications, of course, in a number of these fisheries.

There is a great range between return and investment within the fishery with some fishermen going broke and some fishermen doing all right. What you do about the ones that are going broke, what do you do about the ones that have got to get out of the fishery? A number of ideas have been postulated and royalty schemes suggested. For example, you can have a buy-back system and buy the fishermen out of the fishery business. The information resulting from the developmental research carried out in the various states can be most useful to assist in future solutions.

I would appreciate additional comment from one of our New South Wales biologists who have done such research off the east coast on this particular issue. Perhaps Mr Gorman could make some comment, as this aspect is more related to his field than mine.

ANSWER - MR T. GORMAN (N.S.W. Fisheries)

The original question as I understood it was simply to give some indication of the environmental factors affecting tuna. I'm not really sure how far it fits in but there are certain species off the coast here which are affected by this temperature related environment. This does not necessarily occur over the same period each year or the same kind of period within each season. So you can get either a short or longer season.

Another thing too that is very important as far as the tuna fishermen are concerned is that the whole fisheries system is a very limited one. Basically with that method there is only access to 10% of the fish population that is actually there. Now this yield may appear to the fishermen in circumstances to be over fishing whereas in fact 80% or 90% of the fish population is still there but you just cannot get to it. This is demonstrated very nicely by the purse seiners when they started operating last year for the first time. They are actually getting fish out of the swarms which the pole boats could not get at.

In the banana prawn fishery you have got a different situation because the tropical areas are subject to extremes of wet and dry and under those conditions and also with prawns you have got a year class fishery where the fishery is classed as dependent. Under

those tropical conditions referred to you can get a very big class coming through, to keep the fishery going or you get nothing at all.

COMMENT - DAVID AIRES (New Zealand)

I thought perhaps the fishermen here might like to know how the New Zealand fishermen finance their boats. In New Zealand we have a Fishing Industry Board which arranges funds for fishermen to buy new or existing vessels and to improve their vessels. The money for these loans comes from the Government Housing Corporation, and the Fishing Industry Board which market those fish into fish products (in New Zealand and overseas) and provide technical advice and a service for fishing industry. This Fishing Industry Board is financed by levy on the fisherman's catch and also by subsidy.

COMMENT - MR CHIDGEY (Commonwealth Banking Corporation)

I was wondering if I could make a comment on Mr Sturman's paper. If you turn to page 40 - the problems of finance - where a source for a number of loans is given as funds available to fishermen in Australia. This table - I think Mr Rogers will confirm - is taken from a very good paper prepared by the Department of Fisheries in 1970 or 1971. The period referred to in table 1 on page 40 in respect to the source of number loans is January 1968 to November 1970, if I have got my information correct. And as far as my own institution is concerned the Development Bank - at the top of the list, in that period we are accredited with having loaned out $424,000. To bring that figure up to date and to give you some indication of how things are progressing in this industry, in the year ending 1975 - a fairly difficult year for the fisherman - the Development Bank loaned not $424,000 but $3.4m. to not 32 fishermen but 123 fishermen. So, as far as my institution is concerned, there has been a good deal of development since the period when this paper was written.

On page 41 in the same paper, in the second paragraph, the survey conducted by the Department (which I emphasise at the time was a very good survey which we recommended to many people) highlights that lending institutions, in particular banks, were reluctant to lend on security of a boat alone and required additional land based assets as security. Again, speaking only for the institution to which I belong, the boat can be taken as adequate security. What we are concerned about always in advancing funds for the construction or development of fishing vessels or for that matter any other business is the total earning capability of the business and the viability of the operation as we see it. We do not look for land based assets as security as part of the package. Clearly, if security is available any bank will take it up - that is human nature - but there have been many loans made by the bank on the basis of security of the vessel alone.

In the third paragraph on page 41 it is stated that a survey also indicated that finance was particularly difficult to obtain for boats designed to exploit under-developed fish resources or new fisheries. Obviously this matter has to be taken into account when you are studying the earning potential of a new developing business but, in many cases - and I think in some of our most

successful cases if my memory serves me right, in this period such as when the paper was prepared in 1971 - we had been able to make many successful loans to vessels operating in new fisheries both in the north and in the west particularly. While this of course is taken into consideration it is certainly no impediment to a fisherman to be operating in a new fishery if he wants to approach the Development Bank.

QUESTION - MR R. ELLIS (Consultant)

This is rather a mundane question after the one that has been asked but I was rather intrigued by the relatively low utilisation of loan funds by Victorian and Tasmanian fishermen. I wondered whether this was due to the fact that their profits are so great that they do not have to borrow money to build new vessels or are they in fact not modernising their fleet? Could you answer that question or give me the reason why these rates are so low?

ANSWER - MR ROGERS

I am going to use a little bit of guess work here but I think that what one must keep in mind is the rapid increase in cost with size of vessel and how it escalates. I think Mr Sturman used an example of this towards the end of his paper when he refers to a 60 ft. boat costing $150,000 (probably greater than that now), and an 80 ft. boat costing 300,000 and so the spiral goes up. I understand that on a West Australian prawn trawler, around the 93 ft. length the price quoted has been of the order of $1,000,000 but I leave Mr Verboon to talk about that later on.

I think that the high cost factor perhaps in, for example, Queensland would be largely attributed to the large northern prawn vessels. In States or areas where the smaller vessels have been used the amount of loans required would be much less certainly in total values concerned.

Also, on the distribution of the fishing fleet in Australia, the total number of vessels in Victoria is only 806 which is fairly small in comparison with other States. Tasmania is also very small with only 589 so I think that these two factors must have something to do with it.

QUESTION - MR J. HERD (Department of Transport, Melbourne)

I have enjoyed Mr Glover's reminiscences about gross tonnage, and administering gross tonnage policy. However, it seems to me that light ship displacement is going to leave you open to rather more opportunities for "fiddling".

ANSWER - MR L. GLOVER

I am not talking of "fiddling" in the architectural sense. What I mean is, with the Gross Tonnage Method, if I have a vessel worth $20 million and I need only another 10 tonnes to get me 2½% of the contract price, I will naturally increase the size of the vessel by 10 tonnes to get this 2½% (in a stable architecturally supervised form).

With light ship displacement I cannot see any gain to an

owner by increasing this because the ratio of bounty in relation to light ship displacement does not climb significantly. For instance, a tug (to give it certain displacement) may have to have permanent ballast to obtain the required draft. Another ship may be designed with insufficient stability which requires the addition of considerable permanent ballast. That is no joy to the owner because he has got to cart that extra weight around to the detriment of his cargo. He has got a fuel bill for the rest of the ship's life so I can see no joy to an owner in 'fiddling' with the weight of a ship to gain a little bit of subsidy particularly as the subsidy would be graduated.

COMMENT - MR WESTHORP

Mr Glover, I think your paper is a most excellent one. In regard to gross tonnage versus light ship displacement as a source of subsidy, I also used to be called the 'king of fiddles' as far as tonnage is concerned. I assure you I would far rather try to fiddle gross tonnage than I would try to fiddle light ship displacement. Light ship displacement is after all the one thing that every owner wants to see cut down to the bone because it makes the difference between how much deadweight he can carry.

I would like to point out that most, if not all, shipbuilding nations subsidise their shipbuilding industries. Some of them insist on cargoes being carried in national bottoms in order to assist both the shipbuilders and ship operators. The smaller the ship the more labour intensive is the process of building it and therefore small ships need the highest bounty rates in order to come out on parity.

I think you will all agree that shipbuilding costs must be reduced. I suggest that one way that might be looked at and which we have not discussed here so far, would be to eliminate those costly and continuous demarcation disputes which plague the shipyards by endeavouring to eliminate individual unions and make one union of thipbuilders as they have done in Scandanavia which apparently works very well.

I am quite sure that, with the publications received from governments, it would be easy to work out the average cost of shipbuilding per light displacement tonnage and the Australian costs for shipbuilding could therefore be brought into parity. But I would emphasise the necessity relative to the question of unionism of not subsidising laziness and inefficiency, both of which are, to some extent, present in our shipbuilding industry.

So far as the question of modifications is concerned, I don't see that needs to be taken into account. After all, if you are going to have a ship of a certain light displacement and you decide to modify the arrangement of accommodation it is not going to make very much difference to the overall displacement or the amount of subsidy that can be paid on that particular ship. It is an internal arrangement and, with respect, the weight of accommodation changes that may be made would in any case be fairly small.

Finally, I would say that the essential for any subsidy scheme is that it must give a speedy answer. I know of one particular

shipowner whose ship was completed about two years ago and for which I do not believe subsidy matters are yet finalised. The time value of the money that he is receiving is continuously going down so that in actual fact the benefit to him is continuously reduced in proportion.

ANSWER - MR J. LAVERICK (Carrington Slipways)

I would not like to see Mr Westhorp 's remarks go unanswered. As far as the unions go and the problems facing the shipyard I would like to extend an open invitation to Mr Westhorp to visit our yard, and to comment on that. No doubt many shipowners in Australia are in a similar position to us as far as efficiency goes, and I could go on for hours about the efficiency of the industry and what causes high costs. As far as the unions go, had you been able to attend the Shipbuilding Forum in Canberra on 1 and 2 September, it would have been a big eye opener. I thought I knew all about Union problems but there was a lot spelt out there. Some of the big yards do have a few problems in this area but the smaller yards I think have largely eliminated this problem. I know certainly we have worked hard over the years as have most of the other small shipbuilders. But that is not the only problem, there are others. So any time you would like to come up - I am sure the other builders will offer the same opportunity - you can see the measure of such problems yourselves.

DR TAPLIN

Gentlemen, I won't try to sum up this session. All I will say is that I found it particularly informative and I am sure that you found it a valuable session and I think I can convey to the panel of speakers your appreciation for a job very well done.

FORUM DISCUSSION

CHAIRMAN : REAR ADMIRAL M.P. REED

Department of Defence (Navy)
Canberra

THE FUTURE OF SMALL SHIPS IN AUSTRALIA

In opening the Forum the Chairman stated that from the large number of papers presented at the Symposium, it was clear that we had an ability to design and construct a wide variety of small ships for commercial enterprise and Naval requirements. The requirements for fishing interests, tug owners, survey ships, passenger and pleasure interests, oil rig supply vessels, and salvage operators had all been covered. He doubted however, whether that the vast number of types of small craft being specified could be justified in such a large country with a widely scattered population. The luxury of custom designed craft would become extremely expensive in the future, and he saw the need to rationalise the number of designs and "optional extras".

The Chairman emphasised that the role of the Navy was not likely to change in the future; in particular its trade. Sea trade required the protection of Naval ships, which in turn needed small ships to support them and to support the Merchant Navy in major ports as well as in remote anchorages. The prospect of the creation of a 200 mile "economic zone" would put a strain on the Navy's capabilities in hydrography and fishery surveillance duties, and an increase in the number of patrol craft would no doubt be necessary to discharge these duties effectively.

He stressed the importance of the need to protect and keep open our ports and harbours, and the role that specialist small ships, such as mine counter measure ships, could play in this vital activity.

Whilst the future for design and construction of small ships looked bright, there were some disturbing features such as the apparent lack of market research in the fishing industry, which created uncertainty in the numbers and types of ships to be built, and the problems besetting small private businesses engaged in the employment of small ships (tug owners, barge operators, etc.).

The Chairman then invited each of the co-ordinators of the various sessions to address the Forum briefly on their individual topics before throwing the Forum open to discussion.

Mr HERD stated that he was responsible for determining standards for the safety and well being of people who go to sea in small ships, and emphasised the need for designers to take note of the safety factors, which were essential for the protection of crews of ships during the initial design phase. It was impossible to determine any "cost benefit" from the inclusion of safety factors, but it was clear that the loss of a ship or the loss of life were very costly in terms of our resources. If designers failed to take account of the requirements for safety, the end result could well be the production of a "fatal" ship. He also urged ship builders

not to under-rate the importance of building in safety factors during building.

In the absence of Mr CAMPBELL, Mr K. BROWN introduced the subject of the Role of Small Ships. He apologised for his lack of knowledge in the commercial field and would confine remarks to small Naval ships. There was a trend toward similar ships in the Navy as the expense of ships was related to size as well as complexity. The pursuit of reducing the hull size down to the smallest possible displacement often gave rise to difficulties in installing the equipment. One had to be careful that the quest for a small hull and its consequential savings did not give rise to increased installation costs of equipment.

The skill of the designer and a well considered choice of equipment by the operators were important features in determining the optimum size of the small ship. He saw a bigger role for smaller ships, in the future, both in Australia and overseas.

Dr TAPLIN, in introducing the subject of the economic aspects of a small ship building industry confessed that he was a stranger in this field. He considered that there were two aspects which in his view governed the viability of a small ship industry in Australia. In a country such as Australia it was almost impossible to have a small ship building industry without some form of protection. In fact, this appeared to be a world wide trend, and some degree of protection was afforded small ship builders in most countries. Dr TAPLIN considered this to be a "second class" situation, but acknowledged that it would not be possible to throw open the industry to world wide competition. Practical trade theory tends to support the theory that an industry will lodge in a country which has a natural affinity and ability to produce a certain product. We seemed to be reasonably well endowed with a pool of skills which were needed in the industry. It also seemed that there was no shortage of capital although in most Australian industries we tended to use capital rather poorly. The real success of any industry depended upon the reservoir or skills which was built up from top to bottom throughout the industry. It seemed then that the ingredients for a shipbuilding industry were available in Australia and from a practical point of view posed the question - can we do without such an industry?

Dr TAPLIN said that the other aspect to be considered was the attitude of those who used and operated the ships, and this applied particularly in the fishing industry. He considered that the operators of small trucks and the fishing industry had a lot in common, in that they were two of the few remaining really competitive industries being made up of individuals who were concerned mainly with getting on with the job.

It seemed strange at first sight that fishing should be considered with agriculture as is done in the Public Service, but on second thoughts it was not entirely illogical. The main problems facing both industries seemed to be marked problems. The Australian agriculture industry was in world class in efficiency. It comprised a small number of people spread thinly throughout the industry, but it was capital intensive. Dr TAPLIN thought that if

the markets for the fishing industry could be established, there was no reason to believe that it should not become as efficient as our agriculture and eventually lead to surplus production. He noted that the characteristics of skill and ingenuity were present in the people of both industries. With reasonable management, the problems of marketing could be solved and the designs of new ships for the fishing industry could be produced. He had no doubt that we should not be afraid of adopting a high technology approach to the small ship building industry in conjunction with a vigorous marketing policy.

Mr BODEN reminded the Forum that successful design of small ships really came into being only after World War II. He paid tribute to the Naval Architecture firm of EKEN & DOHERTY and to the courage and foresight of the two principals. There were other groups of consulting designers which had grown up and had served the small ship industry very well.

There was a tendency on the part of the small ship owner he thought, to denigrate the ship designer and to consider the costs involved in the design of ships as a surcharge in a ship project. Mr BODEN stated that there were many instances where the lack of precision in defining the owners requirements to the builder had had disastrous results. He considered that the fees for designers and consultants were as necessary as any piece of equipment and ship owners should look upon these costs as a necessary part of any ship project. Co-operation between the ship owner and the ship designer in the early stages of a project would result in clarity of directions to the ship builder and economies in building. He said that designers must understand the needs of the industries for which ships were being designed and a good example would be found in co-operating between operators and ship designers in off-shore oil rig servicing.

Mr CLARKE doubted that the discussion on Building of Small Ships in Australia would be as fruitful as it might have been, because the papers devoted to the subject were to be presented the next day. He saw the need for an increase in productivity in the industry and said that there were at least two builders who, by their vigorous pursuit of markets, had achieved increases in productivity by concentrating on standard designs and multiple runs of the same type of ship. Whilst there were a number of alleged advantages in the open and uninhibited contact between ship owners and builders in the days before the Ship Construction Bounty Act, he felt that, in the long run, a satisfactory system of administration would emerge which would be to the advantage of both the owner and the builder, and hoped that patience would prevail in the meantime.

He saw the use of a greater variety of construction materials in the construction of a wide variety of small vessels in the future.

One disturbing feature in the building of small ships was the high failure rate of small ship builders. There were about 40 to 50 ship builders registered under the Bounty Act, and he believed it was not the intention of the policy to encourage a large number of small firms to try their hand at ship building and then withdraw. In the interests of improving productivity, he saw a bunching up

of shipbuilders and the subsequent increase in their order books, and hoped that these would be accompanied by increased investment in modern production plant and equipment. Ideally, this should be accompanied by multiple production of standard designs, but he acknowledged that there will still be the need to provide specialised types of craft to meet individual owner's requirements.

Mr CLARKE hoped that the Symposium would give some thought to recording a resolution which might give guidance to the Government on the problems and aspirations of the small ship industry.

Mr MURRAY, in introducing the Operational Aspects of Small Ships, apologised for the lack of papers on the subject, but felt sure that there were those in the audience who could make significant contributions to the subject and hoped that such would be the case on the following day.

He stressed the need for all operators - even down to the smallest fishing boat, to pass back to the designers the problems they had encountered during operations. Without adequate feed back it was difficult for the designer to make worthwhile improvements to benefit the user.

Professor FINK commented on the two approaches to Research - that taken by the academic institutions, and that considered necessary by the users. The amount which had been set aside for research in the past, particularly from Government sources, was barely adequate and the amount was now shrinking. Whilst this in itself was a bad thing, it may have the effect of forcing those involved in research activities to seek funds from the operators, and hence decrease the gulf which he felt still existed between researchers and practitioners.

He saw that the past attitudes where sometimes researchers "came up with solutions without having been given a problem", would give way to a more practical approach to solving the problems of the users in the industry. He pointed out that the small ship industry was relatively small by international standards, and quoted the estimated value of the total small ship business in Australia at approximately 300 million dollars. He considered this to be on the conservative side and thought $400M would be nearer the mark if equipment were included. However, the vessels were only part of a bigger business which relied on the activities of the vessels, and research - in particular market research, was needed if good prospects for the future were to be assured. If we assumed a life of between 15-30 years for a boat, and a total industry value of $300M, we should be spending up to 10-20 million dollars on small ship production, and recent figures indeed showed this was about the level of activity. If we were to expect 1% of $15M to be allocated to research per year, it would produce a good return as overseas experience showed this to be true, given good communications between researchers and operators. Professor FINK drew attention to the paper he had presented at the Symposium in 1973, and wherein he advocated the creation of a Shipbuilding Industry Research Council, he thought that it may be better if the word Research were taken out of the proposal and a Shipbuilding

Industry Council developed. He referred to the Jackson Committee and its criticism of some aspects of industry development.

Mr GORMAN of the N.S.W. Department of Fisheries opened the discussion from the floor. He noted that before World War II there were 18-20 side trawlers of 120-135 feet long operating on the East coast. Since World War II these vessels have been phased out and, technologically, we have gone backwards. Forty years ago the fishing industry was organised to meet the requirements of the fresh fish market, and in 1975, we are still catering for the fresh fish market. In the meantime, the Japanese, Norwegian and West Germans had invested considerable sums of money in fish processing, and have exported the products all over the world.

"Sellers" of fish products are more concerned with marketing a product which will give a good return on investment, preferably in a stable market, and are not interested in investing money in fishing vessels as such. Our fishing industry has presented an image of supplying the housewife with fresh fish, and whilst this may still have been applicable ten years ago, it was out of date in the world of today. It was clear that the only way to prevent the complete demise of the fishing industry was to commence fish processing. Steps had in fact been taken already, and a review of fish resources to support such an industry was carried out some years ago. A research vessel had been built and the results of the research showed that conditions were favourable for establishing a fish processing industry.

Proposals to establish the industry were first floated in 1971, but financial limitations then prevailing put a stop to any further development. Mr GORMAN believed that there were companies who were still interested in entering such an industry with a turnover of some $60M per year. He estimated that a minimum of 5 stern trawlers of about 150 feet long would be able to supply the raw material for an Australian market. To attract Australian capital into a high risk industry such as fish processing is difficult, in fact almost impossible. Foreign capital is already invested in like industries overseas, and therefore, there was little incentive for anyone to invest in the fishing industry in Australia on the scale needed.

One factor which may alter the situation would be the declaration by Australia of a 200 mile fishing limit. If International interests were deprived of fishing grounds, it may be possible for Australia to develop an industry which would ultimately be able to export fish and fish products.

With sufficient evidence available to show that there was a market for fish products in Australia, he saw a reasonable future for small ships for the fishing industry.

In replying to a request by the Chairman for a description of fish products, Mr GORMAN described the various products which resulted from this type of activity. In reply to another question from the floor regarding tinned fish, he commented that this particular part of the industry was relatively healthy.

Regattably, the level of profitability in the tuna industry was only about 3%, and it was hoped to influence business engaged in this low level activity to enter other areas of the fishing industry. He did not like to see compartmentation in the fishing industry, but would like to see greater flexibility.

Mr BODEN asked if there would be any employment outside Australia for the 5 trawlers referred to by Mr GORMAN.

In reply, Mr GORMAN did not think it necessary to fish outside Australian waters, as it had been estimated that a stock density of 30 million pounds of fish prevailed in the 400 square mile area between Sydney and Port Stephens. The total trawling catch from this area, at present, is quoted as 10 million pounds, but the Department of Fisheries thought a figure of 15-20 million pounds over the whole of N.S.W. would be a more accurate figure. It was difficult to estimate the real catch due to the lack of basic data. There was evidence that catches well in excess of those now being taken could be expected in areas outside the Continental Shelf, and he instanced surveys by "The Southern Endeavour" and other vessels on the East coast and the Bight as favourable indications of such catches.

Mr GORMAN did, however, say that a shortage of frozen fish could occur in the future, and it was pertinent that Russia and West Germany had undertaken expeditions to the Antarctic areas to assess the possibility of fishing the Plankton grounds as a source of protein.

There was currently a healthy market from the processing of Hake in a factory at Albany, Western Australia, but he did not have sufficient information regarding its activities.

Mr CHIDGEY (Commonwealth Banking Corporation) discussed the economics of the size of fishing vessels, and the high costs of the larger vessels. He thought it important to specify the correct type of equipment which was needed in the fishing industry to do a particular job, as there was a tendency towards over capitalisation by lack of precise definition. In general, the economic reports he had received were not altogether favourable for expansion of the fishing fleet. There was a need to look to the adequate and proper expansion of our industry with particular reference to recording the proper methods of processing and in marketing products.

He welcomed the optimistic note sounded by Mr GORMAN regarding the 200 mile limit and said that he was not aware of any moves by Australia to declare a 200 mile limit unilaterally. He said that the Law of the Sea Conference had not been very successful, and the whole question of the 200 mile economic zone was an extremely complex question. He was unaware of any policy regarding this, but he understood that the United States is considering a unilateral declaration. He was under the impression that administrative authorities had not given sufficient attention to the Law of the Sea Conference and the essential benefits which might arise from Australia making a unilateral decision to expand to a 200 mile economic zone. In the terms of under developed nations, and we are one such in terms of fishing, we have nothing

to lose and everything to gain by declaring a 200 mile limit - those who will lose are the developed fishing nations. Within the next 5 years, Australia would have to make a decision regarding this economic zone and we should be ready to commit ourselves to such a decision.

Mr CHIDGEY thought that if there were any possibility of Australia declaring a 200 mile territorial limit, it would make economic sense for specifications of future fishing vessels to akcnowledge the requirement to operate over the whole 200 mile limit. This would have to be considered against the alternative of building a larger number of small vessels to work over a shorter range close to the coast. The latter decision would leave us unprepared in the event of a 200 mile zone being declared.

Mr GORMAN thought that there was no need to expand the territorial limit to 200 miles on the East coast and South coasts and in the Bight, as the Continental Shelf is quite narrow and even a 50 mile limit would give us complete protection from foreign fishing interests.

The majority of fishing vessels now operating were between 50-60 feet and even smaller, and were based on daily operations to supply the fresh fish market. The fish processing industry of the future will require continuity of supply, and this could not be achieved by small vessels. The ability of a boat to travel large distances out to sea was not as important as its sea keeping qualities, and its mobility in being able to move up and down the coast.

There was a short discussion about the problems associated with a 200 mile limit, particularly to the north of Australia, and the apparent economic disadvantages in the operation of larger vessels. It was claimed that if a standard design could be achieved, a saving of nearly 15% on the total cost of a vessel might be possible.

Mr CHAPMAN of Whyalla Shipbuilding and Engineering Company posed the question of "Why did we really need a shipbuilding industry?" Some reasons he thought might be found in the commercial profit motive, but here the industry was subsidised, and invited Government intervention. He stated that a possible improvement in the method of paying subsidy may be found in offering direct assistance to shipbuilders to improve plant and equipment, rather than payments to the owner, which eventually found its way back to shipyard employees wages. As small ships appeared to have more problems, those involved in the small ship industry should expect a greater share of Government assistance. Do we need a shipbuilding industry for Defence, and if so, for construction or repair? Do we need it for foreign exchange savings, or to create employment? With regard to the latter, he thought there were better ways of taking up any surplus of labour. He felt that our attitudes in the past had been to establish industries without a thorough investigation of their actual need in a national sense. In reply, the Chairman and Mr CLARKE defended the need for an indigenous shipbuilding and ship repair industry. We were an island nation, and hence depended on sea trade to sustain our economy. The Government has made a decision to rationalise the

industry and this, in the long run, should be of benefit to all associated with the industry. The shipbuilding industry demanded a high standard of quality in fabrication and equipment supply, and it complemented the heavy engineering industry. The skills needed for shipbuilding and the associated heavy engineering industry would be to the benefit of the community generally.

Mr JEREMY from Vickers Cockatoo gave an example of the flow-on from ship repair activities in the field of turbine building and repair. Whereas the majority of steam turbine repairs today were for power generation, and it not been for his company's early involvement in the manufacture and repair of marine steam turbines, this capability would not be available today.

In discussing the type of ship needed if the 200 mile territorial limit were declared, it was thought that a combination of air search complemented by surface craft would be essential to police the large areas involved. The increased length of patrols which would be necessary, shifted the emphasis to sea keeping qualities, and the comfort of a crew, and brought up the requirement for a review of the number and disposition of support bases around the coast.

Mr SCHAETZEL suggested that a combined air and sea search might be possible, using a para military type force, using commercial radar and small patrol boats of the 51 feet class. Such a combination could be obtained at one tenth of the cost of that needed if the task were undertaken by military forces.

In reply Mr HOPE stated that a good deal of work had been done recently in gathering data on sea keeping properties, and attempts were being made to relate this to economic factors. He proposed to develop this point further during the following day's discussion, but stated that present trials in the Navy's "ATTACK" Class Patrol Boats supported the proposal that the minimum length of patrol boat was of the order of 100 feet, and a boat of 140-150 feet seemed to be necessary if adequate sea keeping qualities were to be expected.

The Chairman thanked all those who had participated in the discussion and declared the Forum closed at 8.30 p.m.

NOTE:

Mr CHAPMAN wrote subsequently in amplification of his original question, and to comment on remarks by the Chairman and others. He said that "to my knowledge the question 'Why do we need a ship industry of any kind in Australia?', has never been asked seriously. I feel that this is a significant question, as the answers to this question will determine the action to be taken.

Where a section of the industry exists to satisfy a demand at a profit on the open market there is, of course, no problem.

The problem arises where businesses cannot operate profitably on the open market and some kind of Government manipulation is necessary. The question is important in my view because it will

determine what kind of action the Government should take. To date the action has consisted mainly of pouring money into the business as a subsidy or bounty, which will be gradually reduced in the hope that the industry will respond by improving its productivity.

I submit that this may not be the best way. We must ask ourselves why we need the industry. For example:-

- for defence
  - for construction?
  - for repair?
- to save foreign exchange?
- to create employment?
- for some other reason?

In all these spheres there are possibly other industries which could meet our requirements more economically than the ship industry."

Mr CHAPMAN said that whilst he appreciated the remarks made by the Chairman, Mr E.S. CLARKE and Mr J. JEREMY about the need for a shipbuilding industry, he felt that "at any time, and particularly under the present economic conditions, we cannot afford to accept too many things as established facts or gospel truths. I suppose we can accept it that we need a Navy. But this does not necessarily mean that we need a fully fledged shipbuilding industry. It is quite possible that certain sectors of it will meet the Navy's requirements satisfactorily. Sections which are of little or no use to the Navy cannot and should not be justified by the defence argument.

As far as technological and heavy industry capabilities are concerned, it is quite possible that other industries may be more suitable. Maybe the resources presently used to support shipbuilding would be better placed in aircraft manufacture, if we are looking for technology, or in mining machinery, if we are looking for heavy industry.

Finally with regard to the preservation of repairing capabilities let's consider the following approach.

To preserve a repair capability, particularly for wartime purposes, docks are normally required. Docks are fairly rare on the Australian coast. Some shipyards presently equipped with slipways have in the past proposed the installation of building docks, but these proposals have foundered for lack of economic justification at the company level. However, given the premise above, such a proposal would be a logical place for a Government to invest money to all round benefit. Australia's repairing capabilities would be improved, the particular shipyard would have its new facility, and ultimately the Government would pay out less per ship in bounty.

At the moment this kind of approach is not taken."

Mr CHAPMAN considered that it was important for the Government to try and find an answer to his question as the answer will have

important repercussions for those who now work in the industry. He considered it to be of little personal satisfaction to remain in a section of the industry which neither had little economic benefit to the community nor fulfilled a real need. If such proved to be the case, it would be better to either move to some other part of the industry, or leave it altogether or seek work in one's chosen field of shipbuilding overseas.

THE DESIGN OF SMALL SHIPS, THEIR MACHINERY AND EQUIPMENT

CO-ORDINATOR : MR C.E. BODEN

Boden & Associates
Sydney

Mr Boden referred to his comments in the Introductory Remarks and then invited questions from the floor.

QUESTION - PROFESSOR P.T. FINK

What is the progress in similar overseas countries with regards the use of aluminium in the construction of small ships?

ANSWER - MR BODEN

Considerable advances have been made in Canada and United States, and quite large fishing vessels are being built in aluminium, and reports are that these have proved to be quite successful in the performance of their functions. I am given to understand that two large aluminium fishing vessels have been, or are about to be imported into New Zealand from Canada.

All the evidence seems to indicate a move toward the use of aluminium alloy as being suitable for fishing vessel construction overseas.

QUESTION - MR W.H. SMITH (Consultant Surveyor, W.A.)

With reference to Sundercombe's paper on refrigeration, I would like to point out that fresh water, freon and ammonia have one thing in common. If you fall into a compartment filled with any one of those substances, you will die. The cause of death will be the same in each case. The compartment has no air in it, it will not support life. All these substances are not toxic.

The heading that amonia is a toxic substance is incorrect. It has a very pungent smell and this is possibly one of its biggest advantages in small ship's use.

This type of classification of ammonia has caused it to be downgraded and has not allowed it to be included in the engine room of small vessels. So we now have a new breed of trawlers with ammonia removed from the engine room and placed in the accommodation or steering flat.

In the first instance, it is most uncomfortable for the crew should a leak develop, but the crew can do something about it.

In the steering flat, you have a head room of 3 to 4 feet with a complete ammonia plant in a very restricted area where it is nearly impossible to work.

With ammonia, no one will intentionally enter into a compartment where there is an ammonia leak. You can smell it and look after it. Freon is exactly opposite, and the very fact that it is odourless and colourless by convention, is one of its

greatest hazards.

We have in Western Australia, cases where crew members have only just survived and there have been near fatalities on a number of occasions, where crew members have entered a compartment flooded with freon and have been brought out unconscious.

Another thing is that ammonia has the advantage of being used with steel piping, as against the need for non-ferrous piping with freon - non-ferrous piping tends to work harden.

With ammonia, steel can be used exclusively and can be worked quite easily.

I think that it should be admitted by all authorities that ammonia is a good refrigerant and a very practical refrigerant to use in small ships. It has a very big safety value because of its pungent smell.

I would like Mr Sundercombe to comment on this.

ANSWER - MR SUNDERCOMBE

I am clearly interested in those remarks because there has been a tendency toward ammonia in overseas installations, particularly in Northern and Eastern European countries. I must confess I was not aware of the difficulties in Western Australia.

I believe there have been a number of explosions, from time to time, in cold stores. How do you account for those?

REPLY - MR W.H. SMITH

There has been only one explosion in Western Australia in a number of years. It was a most interesting explosion in that it was a slow revving compressor. In the starting procedure, before the suction valve had even been opened, there was a crank case explosion in the ammonia compressor which blew some of the pistons back up and the whole crank case side through the cold store wall and could be heard for about 10 miles - it was a very big explosion.

MR SUNDERCOMBE

Mr Delman has come along today as a visitor. His paper on 'Refrigeration in Trawlers' is noted in the references at the back of my paper - Mr Delman, would you like to comment on this?

COMMENT - MR DELMAN

I agree with the comments on ammonia. It has the advantage it is relatively cheap and is soluble in water. It has this explosive problem which none of us like. It is relatively expensive as far as equipment is concerned.

Regarding freon, it is not unusual to run freon refrigerant in steel pipes. The only reason we don't do this more often is cost, it is cheaper to do this with copper because of the labour content and weight.

I would agree with most of the comments that have been made. There is a case to have some kind of additive in freon to allow it to have some kind of smell, to give early warning of the loss of refrigerant. I've never known of anybody being harmed by it. The only refrigerant that has brought anyone to grief is, in my mind, methyl chloride. I understand ammonia is very widely used in the western states.

COMMENT - MR SUNDERCOMBE

The main thing about ammonia is that it is completely soluble in water.

REPLY - MR DELMAN

Yes, this is a big advantage and the other thing is that the operators seem to be able to operate ammonia a lot easier than freon.

COMMENT - MR MACALISTER (Harbour & Lights Dept., W.A.)

I would like to endorse some of Mr Smith's remarks regarding the accidents which we have had in Western Australia with freon, with some experiences of my own. I recall once when I was surveying a small ship which had a Gardner engine in it, it also had a freon pump in the engineroom. Those of you who are familiar with the Gardner system will know the air intake is fairly low down. We went to start this engine and it just would not start - some assumed it had an air leak and was getting air locked in the fuel line. We attempted to start a small Perkin engine which was the auxiliary motor driving a freon compressor. The Perkins engine had the air intake right on top of the engine, and also the engine was upon a pedestal. After a few turns this engine started and emitted various large clouds of very pungent white exhaust, which was the combination of the products of combustion and the freon gas. But my point is that there were three of us in this engineroom, and none of us knew that there was a freon leak and that the engineroom was half flooded with freon. If someone had attempted to go down into the lower part of the engineroom, he could have possibly died - he would not have known of the danger.

One of the other accidents which Mr Smith mentioned, was a case where they were changing the system and there was a leak in one of the coils in the hold, and one of the crew went down into the hold. There again, the hold was flooded with freon and he was very fortunate, someone on top saw him staggering around and pulled him out.

Another accident occurred with a man going down to work on the stern gland in the motor room; unfortunately again there was a minor freon leak which had flooded the engineroom low down. Again, it was very fortunate someone saw him and pulled him up.

Possibly Mr Pearce from Queensland may have some knowledge more than I, I do understand there was a man killed up around the Thursday Island area with a freon leak. He again was working on a stern gland and was overcome.

We have had very strong representations from the industry in

Western Australia to allow a return to ammonia refrigeration in enginerooms.

I am well aware that most of the Classification Societies are against the use of ammonia in the enginerooms, I think that this may be due to the fact that they are considering manned enginerooms, whereas we, in the small vessels, are looking mainly at the unmanned engineroom situation.

As you know, from the paper which Mr Herd presented, there has been a lot of work done by the A.A.P.M.A. on standardisations of fishing vessels. This subject, whether or not to use ammonia on fishing vessels, has been discussed at considerable length, the outcome of it is, the paper on the Engineering Standards for Fishing Vessels which should be issued very shortly, will have a clause in it which will permit ammonia to be used in unmanned enginerooms under certain conditions like the fitting of water sprays and safety valves and other safety devices.

I have no knowledge of any explosions in an ammonia system. I honestly feel that you have just as much danger with other high pressure systems. In these days where you have very tight control over pressure vessels and piping systems and everything like this, I myself cannot see any great danger in ammonia. Western Australia is one of the states that have pushed to get it back into fishing vessels, we realise it has a great advantage in the fishing industry.

That being so, both ourselves, the Department of Transport and other marine authorities in the past have agreed to allow ammonia in fishing vessels although we have not agreed to allow it in the engineroom.

I cannot agree that this is a greater hazard than having freon in the engineroom. We usually lock it away in a small place then somebody must on occasions go down to check it over. Generally, it is in these small places that it is hazardous and if there was a major leak while he is down there it would certainly be impossible for him to get out. Whilst in the engineroom with an entry at one end and an escape hatch at the other, you would have a much better chance of getting out of the engineroom which has a large ammonia leak than from some of the small compartments with ammonia machinery.

COMMENT - MR HERD (Department of Transport)

I would like to comment on all the papers except Mr Sundercombe's because I'm not a refrigeration expert and I am happier on my own territory.

In regard to Mr Trout's paper, I don't know whether it is generally known or not, but the present Navigation Bill, which is being passed through the House of Representatives, is making provision for something which IMCO has recently defined and that is 'a special purpose vessel' and in association with special purpose vessels of course there are people called special purpose personnel, and these are intended to cover things like research vessels which Mr Trout's paper covers. I think also, fish factory ships which might carry two or three hundred women for processing, such as the Russian vessels.

The special purpose personnel is really one which would fall somewhere between the crew and the passengers. The passengers normally are regarded as being completely helpless. Consequently, they have to be guided and cannot be expected to find their own way from a cabin to a lifeboat to life raft in the event of an emergency.

Special purpose personnel are regarded as being substantially able bodies who have some marine knowledge and some degree of training. Once this bill passes through the House, of course vessels such as the proposed C.S.I.R.O. vessel will, I think, so far as we are concerned anyway, come in the category of Special Purpose Vessels.

Turning to Mr Boden's paper, I was very interested in this because it ties up with the work we are doing in committee, in regard to producing notes for construction with the five materials, ferro cement, aluminium, steel, timber and G.R.P.

The approach that we are using there is as I think I outlined in the paper. We are treating aluminium straight as a material and we are endeavouring to take full advantage of its inherent properties and not using it as a substitute for steel.

The one point which I cannot find very much on in Mr Boden's paper, relates to the question of structural fire protection, because under the construction regulations, in our department at any rate, aluminium would need to be insulated to achieve some measure of equivalence to the performance of steel at the end of the hour standard fire test.

So far as Mr Dummett's paper is concerned, I'm sorry that he did not comment on Stability in this. When I saw the title of 'Manoeuvrability', I was hoping that something on stability, in particular girting, might be tossed in for consideration.

In regard to the other papers by Professor Paulling and Mr Doherty - two aspects. Firstly on the offshore supply vessels, it may not generally be known that U.K. has recently amended their stability requirements for supply vessels, to require that stability should be submitted on the basis that the vessel is floating free and that the usual assumption that when the vessel heels it does not also trim, no longer applies.

Professor Paulling's paper rather effectively demonstrates that at least, as far as offshore supply vessels go, this concept is fallacious and we are certainly looking at this at the moment with a view to doing much the same ourselves.

The other point is something else I mentioned yesterday, and that is in regard to the forthcoming International Convention on the 'Safety of Fishing Vessels'.

It is intended that fishing vessels do not have a freeboard mark computed on the normal geometric basis. Their freeboard will be controlled by means of their stability. An aspect of stability in which due account must be taken in the computations, will cover severe winds, rolling, water on deck, and associated with that there is going to be a requirement for bow height.

I mentioned yesterday, I do have the present draft of the proposal for the convention with me, if anybody is interested in having a look at it. But no doubt after the Conference in 1977 we will be doing our best to incorporate this into our own legislation.

REPLY - MR BODEN

I would like at this stage to repeat a remark which I made earlier.

We are sorry we are not able to have with us either Mr Trout or Professor Paulling. Mr Trout is associated with the White Fish Authority in Great Britain and we are grateful to him for the contribution he has made to this session. Professor Paulling was visiting Professor at the N.S.W. University earlier this year, but unfortunately he had to return to his own area but was good enough to present this very valuable paper being discussed this morning. In the absence of these two gentlemen, Dr Laurie Doctor will act in the place of Professor Paulling and Mr Don Gillies in the place of Mr Trout.

Concerning Mr Herd's remarks on aluminium, I quite agree that when aluminium is to be used as a new material we should think of it as such and not merely to replace a steel section using the same form in aluminium as we would in steel.

I think one of the big virtues of aluminium is that it can be extruded into a variety of shapes so that it offers the possibility of being able to design new shapes, more effective perhaps than some of the shapes we have been accustomed to using in steel construction. I agree with Mr Herd on that particular point.

Regarding fire protection, this of course will have to be taken into account. It is obvious of course, that no new materials possess all virtues and no vices and in my paper I endeavoured to point out some of the vices. I must confess I did not mention this particular one but undoubtedly, in the necessary research to make use of the material more fully, this will be one of the features to be considered.

MR GILLIES' REPLY IN RELATION TO MR TROUT'S PAPER

Mr Herd referred to an interesting fact, which is of course that women scientists and women generally will be more likely to be engaged in fishing activities as vessels become larger, and will be engaged in wider fishing operations, especially in the long term should factory vessels eventuate. This is an area where large numbers of females would be employed.

In C.S.I.R.O. vessels, this does apply at the moment in the Fisheries and Oceanography Division at Cronulla. A number of women scientists are engaged in all sorts of work ranging from chemistry, to fish biology and physics, and they of course frequently go to sea in vessels of our fleet. I would not say they enjoy this experience but certainly they do it with good grace and survive reasonably well. There is no reason why we should not see in the future a lot more women serving in this type of vessel.

The Department of Transport, with which Mr Herd is vitally concerned, is to be commended for making provision for special purpose personnel. They are frequently very quick to learn the rules at sea and have a very good knowledge of nautical matters. Just as a classical example, we have one female scientist who comes across to the office, regularly every morning, by surf ski from Bundeena!

I would like to mention very briefly, the basic philosophy behind the Fisheries and Oceanographic Research Vessel which is proposed. This won't take very long but it will give you a better idea of what we are trying to do and therefore engender some discussion.

In order to appreciate the design philosophy behind the suggested vessel, it will probably be helpful if I very briefly outline the major fisheries research and oceanographic functions which it is intended to carry out, not necessarily all of them but at least the major ones.

Looking firstly at the fishing capabilities, it is required that the ship performs exactly the same functions as a stern trawler and be able to tow either the standard Granton trawl, the net of which is about 50 metres long, or Engels midwater trawl, which could be 100 metres long. Both of these nets are very large and involve loads in the trawl warp wires which could go up to say 12,000 lbs. When using the Granton trawl close to the bottom of the Continental Shelf, special sonar instrumentation is necessary to provide an accurate trace of the contours of the bottom and the position of the net in relation to the bottom. This is very important if extensive damage to the net is to be avoided.

For fish biology purposes, rapid refrigeration of catch samples is necessary and ample capacity of chambers is required, operating at temperatures down to about -30 degrees Celsius.

Extensive laboratory space is a prime requirement but since the ship is to supply multidisciplinary facilities, one standard type of laboratory layout is not acceptable.

Here I would interpose that we hope many scientific institutions will use this facility. It will be available to any organisations who may wish to use it for specialised research compatible with the C.S.I.R.O. programmes.

The laboratory areas will require portable bulkheads. We will need to be able to change the spaces of the various laboratories to suit the function of the scientist using them at the time.

We will also need modular fittings such as benches, cupboards and other types of laboratory furniture which can be moved about to suit the particular experiment being carried out at the time. This of course, involves portable arrangements for power outlets, water and gases, to a number of different positions and also involves the question of disposal of waste which is quite a difficult problem.

Basically, laboratories are required for chemistry, zooplankton

and phytoplankton research, physics and fish biology, to name just a few.

On the oceanographic research side, one of the major considerations of course required of the vessel, is accurate positioning and station holding. The vessel has to remain virtually locked in the one position while specific samples are being drawn or other research is being carried out.

To achieve these requirements, the ship must have sophisticated satellite navigation systems linked with computer systems and computer facilities and positioning is assisted by keeping the projected area of the vessel to a minimum to avoid windage. Accurate propeller speed control, and a rotatable bow thruster of adequate power to hold the ship against the wind, or other conditions, is essential.

Other central instrumentations include radar, sonar, R.D.F., auto pilot and very good communication systems. For some oceanographic, as well as fish finding work, highly sophisticated sonar and hydrophone equipment must be mounted on the hull externally and this involves changing the transducers within the hull without the necessity to dry dock the vessel. So we have had to make provision for a pressurised chamber to house this equipment which may be entered through an air lock in the ordinary way as found in a submarine, so that the transducers can be changed.

The sensitivity of some of this underwater equipment necessitates an absolute minimum of ship generated noise either externally from the propeller or the appendages to the hull, or internally from the main and auxiliary machinery.

To reduce vibration and noise, the main engine and other reciprocating auxiliaries are mounted on a heavy steel raft (which is referred to in the paper) and which in fact floats on resilient mounts which initially will be of metalistic rubber type, but alternatively provision is also being made for a constant position mounting system, such as adopted by the Royal Navy, whereby the machinery and raft is mounted on a cushion of air.

Additionally, in order to reduce airborne noise in the machinery space, the main reciprocating machinery is enclosed in an acoustic hood.

In order to obtain oceanographic water samples and bottom samples, heavy 'A' frames for lifting and towing are required with good cranage facilities for handling buoys at sea.

A stable platform is needed as far as possible in adverse weather conditions, which calls for some form of stabilisation, and in this case a static tank system as distinct from a flume tank has been selected.

MR BODEN

Thank you very much, I am sure that will open up further discussion.

COMMENT - MR K. HOPE (Defence Department) - ON MR TROUT'S PAPER

Regarding the bibliography. I would mention a book of Urik - "Principles of Under Water Sound for Engineers" by McGraw Hill Publications of the 1960's. Dr Urick is an underwater scientist with the U.S. Ordinance Laboratory. He refers to two types of noise - one on radiated noise, the other one self noise, and the distinction between the two and the importance in the design stage is drawn out quite well.

The R.A.N.'s experience with sonar self-noise is that by no means can you exclude the consequences of quite minor auxiliary machinery, valves with particular discrete frequency flow characteristics or bends in pipes situated quite near to the transducers.

It is not completely true that the propeller which is dominant certainly in radiated noise as a defence aspect, is dominant in the self-noise contribution.

Thus I suggest as a point of design that people involved in this sort of vessel should be very cautious and exceedingly pessimistic about the consequences of any form of machinery or piping system around a transducer.

Passing on to raft mountings.

These have been used widely in defence Naval type vessels and are very effective - it is desirable that the raft should be put with the mounting underneath the node points within the coverage of the raft.

It is clear that one of the main objects of a raft is to minimise the transmission of vibration to the hull. One case was known where the raft was at an anti-node position in which considerable amplification of the vibration to the hull was experienced.

It is a matter of some skill and scientific attainment to find out just where these points are. My understanding is that probably in Australia only YARD (Australia) would have some capability in this area because of their parent firm's association with the Royal Navy, who have widely used these fittings.

Flexible connections are essential and every pipe needs to be flexibly connected to and from the raft.

Referring now to paragraph (e) on page 27 "tuning is essential for the sea state selected". From my discussions with Dr Lewison at NPL between '71 and '73 in connection with the Navy's oceanographic ship "Cook" which has provision for a stabiliser. The tuning is certainly required for the natural period at sea in the sea-state of the ship but the words sea-state to me imply height and length of wave and it is certainly not true that passive stabiliser tanks are terribly sensitive to differences in wave height. They work quite well, if they work at all, at 10 feet as well as at 5, but those many instances where passive stabilisers have not met peoples expectations seem to occur where differences in GM or weight or radius of gyration have occurred between the design

calculations submitted to the designers and what actually appeared on trial. The technique adopted tentatively by the R.A.N. in the case of the design of the oceanographic ship was to allocate a space and to leave questions of how much water and model testing etc. until the ship is in fact afloat and actual experiments can be done on such things as damping ratio for instance in roll and the actual wiehgts and disposition of weights can be determined.

MR BODEN

In the remainder of the time, I propose that we should deal with papers in sequence.

Mr Gillies would like to reply to the previous speaker.

REPLY - MR GILLIES

On the question of noise generally, we have received a tremendous amount of assistance from the R.A.N. Experimental Laboratory.

We have been in communication with the U.K. and have also had assistance from consultants in Adelaide.

The detailed levels of noise criteria which we are endeavouring to meet, have been prepared by the Shipbuilding Division of the Department of Transport. I guess if Mr Gibbons is here this morning, he may care to say something about that. He might answer some of the points raised on the subject of noise levels.

On the question of ship generated noise, the propeller which has been designed at N.P.L. is designed on the basis that we do not want any cavitation whatsoever up to 12 knots. At 12 knots most of the work that we will be doing, which involves this equipment, will be quite satisfactory. The ship is capable of 14½ knots, but we anticipate that 12 knots would be the maximum we could hope to achieve with noise free operation from the propeller.

On the question of hull or machinery transmitted vibration through the hull, it will be noted in the paper on page 27, that the shell plate thickness has been increased to approximately twice Rule thickness. In other words, the shell plate thickness is about ¾" right up to the load waterline. There are two basic reasons for this - one is to provide greater inertia to the shell to resist vibration and, secondly, to give good fair lines to reduce to an absolute minimum the possibility of water turbulence over the hull.

On the question of raft mounting, we have had great assistance from YARD, Glasgow. They have been responsible for the design of the CPMS system which we may be using later on.

Stabilisation Tank: Tuning is in relation to the G.M. and the period of roll will change. The tank needs to be adjusted on the basis of the ship's condition. Provision is made for that in the design.

COMMENT - MR GIBBONS (Department of Transport)

The high frequencies are certainly the ones to watch as far as equipment and mountings are concerned. We have also studied the problem regarding the question of propeller cavitation inception speed of 12 knots. We want a very quiet ship up to that speed. The raft itself will be mounted on rubber mounts initially. This again is in relation to these higher frequencies because it is doubtful whether attenuation at very low frequency is really necessary for detecting fish.

The rubber resilient mounts are very efficient but they are not as good as the constant position mounts. The raft of course is very rigid on a very strong base.

QUESTION - MR BILL BARLOW (Oceanic Pty Ltd.)

Mr Gillies did say that other organisations than the C.S.I.R.O. would have use of the vessel.

Could you tell us which other organisations will have the opportunity and for how long at a time, and how much necessity is there for this to be done and its effect on its usefulness to the C.S.I.R.O.?

ANSWER - MR GILLIES

There are about 15 organisations in Australia which are vitally interested in doing oceanographic research work and/or fisheries research.

Probably there are more in the area of fisheries research of whom we don't know. But certainly all the universities that have marine biology departments are interested in booking space in this vessel, and there is a technical committee on oceanography which tries to co-ordinate the activities of all people in Australia who wish to do oceanographic research, with a view to allotting berths from time to time in all the available ships.

The only available vessels at the moment are our own ships, H.M.A.S. "Diamantina" and H.M.A.S. "Kimbla" which the Navy allow us to use periodically from time to time, and any foreign vessels which may happen to be cruising in the area.

For instance, there is a Japanese research vessel heading this way at the moment. It is hoped that a few of our people will be able to get berths, at least around Australia, to do some work.

We hope to be able to cater for this type of person.

QUESTION - MR BARLOW

Is the allotment to be on a berth to berth basis rather than on a cruise or ship basis?

ANSWER - MR GILLIES

Yes, we would have to allot berths because being a combined fisheries and oceanographic research vessel, it is unlikely that

one organisation would have enough people to fill the whole of the available berths.

We have accommodation for 19 scientists on board. This would mean that a fairly large organisation dealing in both fisheries and oceanographic research would be needed to be able to take over the ship completely.

This is really not envisaged, certainly it would go on a berth by berth basis.

QUESTION - MR McQUIRK TO MR GILLIES

I found this a very interesting paper and probably the main thing I learned was that these research vessels are very expensive.

Do you believe that it is worth spending the money on these vessels if the valuable information they gather is not put to maximum use? I realise that these vessels gather more than just fish stock information.

However, I feel a prime example of this problem is the research being carried out by the F.R.V. Kapala on the deep water grounds off the N.S.W. coast. For several years now the State Fisheries have been carrying out deep water fish and prawn trawling operations and have established the basis for a viable industry. However, so far no actual fishing operations are being carried out.

This problem is caused by the fact that there is no market for the product caught.

Would it not be better to spend some of this research money on a market development and production program and to get a processing system working for locally caught fish?

The aim of this Symposium is to develop the small ship industry, which includes fishing vessels. If a new industry is developed would it not help develop new vessels and gear?

I have used the example of the Kapala operation, however, this is happening in many areas and is something which must be tackled very soon if the fishing industry is to develop thus developing small ship construction.

QUESTION - MR GORMAN TO MR GILLIES

I get the impression from this meeting that many of you believe that the proposed new C.S.I.R.O. vessel is unique. This is not the case, the vessel is being designed along principles that were first adopted 10-15 years ago with the construction of the new generation stern ramp shelter deck research vessels overseas. These principles have been subject to considerable development over this period, and have been applied in part or in full to most of those in service today.

Ship generated "noise" has always been a problem when using acoustic instruments and the precautions referred to are quite normal practice. However, it is still possible to build a noisy ship despite taking the precautions referred to as evidenced by

the Scottish research vessel "Scotia". The problem of noise can be eliminated in echo sounder by using a high speed towed body for the transducer, but unfortunately this is not practical for the conventional search light type sonar.

One very important factor which requires stressing is the need to provide a stable platform for sonars, but more particularly for fish counting echo sounders. It adds enormously to validity of results if this beam can be stabilised, and this can be affected by either gyroscopic or mechanical control, or use simply by a towed body.

In regard to the design of the vessel as a whole, it based on the British Ministry of \griculture and Fisheries research vessel, "Cirolana" which has proved in practice to be a very satisfactory design. However, I have two major criticisms of the design as it exists now.

Firstly, the designers have chosen to ignore one of the fundamental assets of the twin deck shelter deck concept, by not using the shelter deck space immediately below the weather deck for handling and sorting the fish.

Secondly, the concept of meeting varying laboratory needs has been successfully tackled by the French and \mericans by using standard ship cargo containers specially fitted out for particular needs and which require only an umbilical cord for the supply of services.

Referring to the use of the shelter deck space, the advantage of using this space for fish sorting and handling is two fold:-

1. The scientific staff can work free from exposure in air conditioned comfort regardless of latitude or sea state, which is extra important considering that the vessel will operate from the tropics to the Antarctic

2. The scienfific staff and their helpers are physically separated from the deck crew on the weather deck immediately above who are engaged in handling the fishing gear. From the safety stand point alone this is highly desirable as many of the scientific staff would have little sea going experience and they are physically removed from the most dangerous working area of the ship.

MR GILLIES - REPLY TO MR A. McQUIRK

The first point raised by Mr McQuirk is quite a valid one in so far as research vessels as a ship-type are inevitably fairly expensive because of the quantity and quality of scientific equipment installed and if they are to be effective, this equipment must be installed. The cost is also usually higher than with a standard type commercial vessel because they are invariably designed for very specific purposes which usually only require one vessel rather than a number of similar vessels. In the case of the proposed vessel for C.S.I.R.O., Division of Fisheries and Oceanography, the dual functions of oceanographic research and fisheries research sometimes imposed conflicting requirements on the designer and some degree of compromise is unavoidable in order

to obtain the best of both worlds. But it does add to the capital cost. On the subject of marketing of the catch, I agree that both marketing and processing of fish in Australia are subjects requiring a great deal more attention than previously if a viable industry is to be developed. I think steps are being taken at the present time to examine this possibility with the object of providing outlets for the catches of local fishermen within Australia. The need to induce more Australians to eat fish is, I understand, also receiving the attention of the appropriate authorities.

MR GILLIES - REPLY TO MR T. GORMAN

Mr Gorman is quite correct in pointing out that he proposed vessel has been designed in accordance with well-established principles for vessels of this type and there was never any intention to produce a "unique" design. On the contrary, the design philospphy was to produce a well-tried but refined design which would incorporate the latest technology in the areas of both ship and scientific instrumentation, and which would provide the best possible results.

In the course of developing the basic coneept, the possibility of using the shelter deck immediately below the weather deck for handling and sorting fish was certainly not ignored as a number of the earlier vessels to which Mr Gorman refers were closely examined in this area. However, in order to keep the length and hence basic cost of the vessel to an absolute minimum, it was decided that this prime accommodation spacd should be utilised for accommodationppurposes rather than as a working area. Furthermore, the C.S.I.R.O. decision was subsequently confirmed by the owners of the research vessel "G.O. Sars" - a similar ship - who have the shelter deck space available for handling and sorting fish but never used any of it for that purpose despite the fact this vessel operates in high northern latitudes and often under very adverse weather conditions.

Containers used as laboratory spaces have also been carefully considered during the design of the C.S.I.R.O. vessel and the experience of other people is that there are many drawbacks and it is not quite as simple as the attachment of an umbilical cord for the supply of services. For instance, both hot and cold water connections are essential and a suitable waste drainage system is needed for some laboratories. All of them require air conditioning and possibly fume extraction which would preclude the use of an ordinary domestic-type air conditioning unit. Containers would of necessity be mounted on deck and in heavy weather access could be difficult or impossible with consequent interruption to work schedules.

In an endeavour to provide the best possible, steady platform for the laboratories, they have been carefully sited for access to all the essential services which would ordinarily be provided ashore.

MR J. EKEN - WRITTEN CONTRIBUTION ON MR DOHERTY'S PAPER.

I would like to take issue with some remarks made by Mr Doherty in his paper on "Development of a class of rig supply - anchor

handling - and towing vessels".

In the first place, the remark on increased cost of vessels belonging to what he calls the "Sarah" class of supply vessels, beyond the rate of inflation, during the time that the Builder received recognition from one Government and assistance from another.

Obviously Mr Doherty groups the seven vessels into one class on the basis of identical hull shapes. This is a glib but thoughtless way of cost comparison, unfair to the Building Contractor.

If we divide the light ship weight and the cost over three groupings as follows:

1. Steel Hull - comprising loft work, materials, ordering, handling and receiving, all steel plate and sections for hull work, excluding nozzles, A brackets and rudders, launching, testing and trials.

2. Main Propulsion Installation - comprising main engines with their attendant piping, fittings and valves for starting, fuel, circulation and exhaust, reverse-reduction gearboxes with attendant piping, fittings and valves, lines of shafting with bearings and attendant fittings, sterntubes, A brackets, nozzles and propellers, together with controls and instruments but without pumps, compressors and their drives or storage vessels.

3. Outfit - comprising all other weight items such as alternator sets, switchboards and subboards, electric wiring all pumps, compressors and fans with their drives, storage vessels for air and cement, all attendant piping, valves and fittings, deck machinery, navigation equipment, mooring equipment, fire fighting, ventilation, air-conditioning, insulation, etc.

and estimate the appropriate weight and cost to each group, we obtain approximately for "Lady Sarah" and "Lady Vilma",

Steel Hull	600 ts	Cost approx.	$A0.4 Million
Main Propulsion	140 ts	" "	$A0.34 "
Outfit	190 ts	" "	$A0.66 "
Total light displ^t	930 ts	Total cost	$A1.40 "

"Lady Rachel" + Yearly steady inflation 7%

Steel Hull	600 ts	Cost approx.	1.07x$0.4 = $A0.428 Mil.
Main Propulsion	140 ts	" "	1.07x$0.34 = $A0.364 Mil.
Outfit	250 ts	" "	$\frac{250}{190}$x1.07x$0.66 = $A0.929 Mil.
Total light displ^t	990 ts	Total Cost Approx.	= $A1.721 Million

It is to be noted that the Contractor offers a reduction in price for the repeat order from $A1.75 to $A1.68 million.

However, the next batch is conceived in the rising inflation generally considered of the order of 20% per year. We obtain then for,

"Lady Gay"

Steel Hull	600 ts	Cost approx.	1.2x$0.428 =	$A0.514 Million
Main Propulsion	140 ts	" "	1.2x$0.364 =	$A0.437 "
Outfit	285 ts	" "$\frac{285}{250}$x	1.2x$0.929 =	$A1.271 "
Total	1025 ts	Total Cost =		$A2.222 Million

It is to be noted that the Contractor raises the cost of the repeat order from $A2.2 to $A2.4 million, a clear reflection on the prevailing uncertainty of inflation accounting in tenders.

Lastly, taking into account the increased power installation, we obtain for "Lady Jane", without weight increase,

Steel Hull	600 ts	Cost approx.	1.2x$0.514 =	$A0.617 Mil.
Main Propulsion	140 ts	" " $\frac{5200}{4200}$ x	1.2x$0.437 =	$A0.65 "
Outfit	285 ts	" "	1.2x$1.271 =	$A1.525 "

Again, the resultant approximation confirms the tender price offered reasonably close.

What is evident from these figures points to the necessity not of finding new unsubsidised Building Contractors, but of bringing in competitive sub-contractors.

Hull cost occupies a reducing percentage of the total and the growth is mainly in outfit which successively occupies for,

"Lady Sarah"	$\frac{0.66}{1.4}$	x 100	=	47.14%
"Lady Rachel"	$\frac{0.929}{1.721}$	x 100	=	53.98%
"Lady Gay"	$\frac{1.271}{2.222}$	x 100	=	57.2%
"Lady Jane"	1.525	x 100	=	54.6%

Without engine power increase, the "Lady Jane" percentage would have appeared constant at 57.2%.

Secondly, Mr Doherty refers to the movement aft of the engine room compartment in exchange with the bulk cement compartment to minimise structural fire protection, noise effects and shaft lengths, as well as to the interposition of a rig chain locker. It is true that this movement provided the benefits mentioned. However, in actual fact, at that time the rearrangement as mentioned had been effected on a simultaneous design for Tidewater-Port Jackson, whose Director originated this idea, inclusive of the half raised foredeck and consequently, the "Sarah" class layout was not a result of, but resulted in the benefits mentioned.

Thirdly, the original drilling rigs contracted for in Australian waters consisted of drill ships. All deliveries had to be made by coming alongside. Under these circumstances, it was unavoidable that damage in a seaway occurred on both sides. Complaints that the fenders, as provided in pressed triangular steel shape, damaged the drill ship and that the straight sided upper edge of the chines of the supply vessels of Tidewater-Port Jackson received a bashing, were numerous. The solution was sought in sloping sides on the supply vessel.

Later contracts, such as Sedco, who used drill platforms and the construction of Australian drilling platforms, eliminated the urgent need for bilge protection. This is due to the fact that the supply vessel moors stern to towards the platform on her own bower and with two spread sternlines to the platform, keeps under the range of the platform crane whilst being clear of the platform legs.

It is felt that mention should be made of the unstinted co-operation, information and advice received from the pioneers in the oil drilling rig supply industry, such as Mr Needham, Director of Tidewater-Port Jackson, Mr McCubbray, Superintendent; Capt. R. Vorenkamp of SEDCO; Capt. J. Hesselberg of G.S.I. and Captain Duncan McBain of A.O.S. Without their help many misconceptions could have caused a hitch in the development.

Coming to stability statements, it must be pointed out that the Condition No. 7 Max. deck cargo arrival mentions erroneously Nos. 4 and 5 tanks Port and Stbd. as containing drillwater. This could well be the occasion in other Conditions of loading, but is misleading in this case. The contents, although of possible fresh water nature, are indespensible for the safe stability of the vessel. A call from the drilling boss for water before accepting the deck cargo, which is quite possible would create a serious rise of the centre of gravity. The misnomer should be designated "essential ballast water".

The trial results given for the bollard pull in Fig. No. 3 are based on (Eng. RPM)2 x 10^{-3} and not on $RPM^2 \times 10^3$.

It is possible to deduct from the trials as given in the small scale diagrams; a pull constant $kp = \frac{P \text{ in kg}}{\frac{1}{2} \rho n^2 D^4}$ works out at,

for "Lady Sarah" Mean kp = 0.4732
and for "Lady Wilma" " " = 0.4777 Overall mean = 0.4755

Due to roughness scale effect the model rps would be less than directly proportional. The roughness scale effect of a Wageningen K4-60 propeller works out in a decrease of k_q for the ships propeller of 0.00052 on a k_q value of 0.04402.

This is equivalent to a reduction of k_t to $\frac{0.0435}{0.04402} \times 0.51 = 0.5039$

The thrust deduction at bollard pull is thus,

$$\frac{0.5039 - 0.4755}{0.5039} \times 100\% = 5.63\%$$

This figure should be reduced by the effect of nozzle built into the hull losses, which brings the thrust deduction back to an entirely conventional figure provided that k_t is taken for nozzle plus propeller, contrary to British tank practice. The British practice of expressing thrust deduction as a percentage of the propeller thrust measurement only results in seemingly excessive high thrust deduction percentages.

Furthermore, it is possible to calculate approximately the torque available at the propeller under one engine per shaft conditions where the full torque is developed,

For "Lady Vilma" 3029.08 kgm and a corresponding torque of 2679.76 kgm for "Lady Sarah" at 570 eng. RPM, as well as 2878.52 kgm for "Lady Rachel".

The resultant model k_q are for,

"Lady Vilma"	0.02839
"Lady Sarah"	0.02784
"Lady Rachel"	0.02701

The corresponding advance coefficients and Taylor wake % are,

"Lady Vilma"	$\frac{ve}{nd}$	0.635	ω_t = 13.92%
"Lady Sarah"	J =	0.645	ω_t = 13.35%
"Lady Rachel"	J =	0.66	ω_t = 12.46%

The $k_{t_{N+P}}$ values are for full intact nozzle:

LV	=	0.158
LS	=	0.1503
LR	=	0.1385

The $k_{t(N+P)}$ values are for built-in nozzle could be reduced by 0.0194, making,

LV $k_{t_{N+P}}$	=	0.1386
LS	=	0.1311
LR	=	0.1191

Total thrust is:

LV	=	11812.4 kg
LS	=	10084.2 kg
LR	=	10151 kg

For the full speed trial a somewhat rougher determination can be applied from the fuel consumption information which is for,

"Lady Vilma"	12.5 tons approx.
"Lady Sarah"	12.4 " "

On the basis of 0.16 kg/HP hr. for all purposes the power of:

"Lady Vilma" is $\frac{12.5 \times 1016}{24 \times 0.16} = 3307$ HP

"Lady Sarah" is $\frac{12.41 \times 1016}{24 \times 0.16} = 3283$ HP

Allowing an auxiliary HP of 160, the power per engine is,

LV $\frac{3307 - 160}{2} = \frac{3147}{2} = 1573.5$ HP

LS $\frac{3283 - 160}{2} = \frac{3123}{2} = 1561.5$ HP

The corresponding torques are,

LV $\frac{0.985 \times 1573.5 \times 76}{2 \times 3.8302} = 4894.6$ kgm

LS $\frac{0.985 \times 1561.5 \times 76}{2. \times 3.8302} = 4857.2$ kgm

The resultant propeller torque coefficients are,

LV	0.0296	Corrected for scale roughness	0.0301
LS	0.0293		0.0298

providing advance coefficients of,

LV J = 0.6
LS J = 0.605

V_e is thus for,

LV 0.6 x 9.767 = 5.8602 m/sec.
LS 5.909 m/sec.

and the Taylor wake fraction,

LV = $\frac{6.8201 - 5.8602}{6.8201} \times 100 = 14.07\%$

LS = $\frac{6.7904 - 5.909}{6.7904} \times 100 = 12.98\%$

Time is lacking to attempt an analysis of thrust deductions from careful resistance calculations, but at least the order of wake factors applicable appears established for this type of hull shape.

Preliminary calculations for "Lady Sarah" indicate,

Resistance at 10.8 knots = 7089 kg
" " 13.191 kts = 16662.5 kg

2 x Propeller thrust at 10.8 knots = 10084.2 kg
" " " " " 13.191 kts = 22428.6 kg

Thrust deduction at 10.8 knots = 29.7 %
" " " 13.19 knots = 25.71%

REPLY - MR J. DOHERTY TO MR EKEN'S WRITTEN CONTRIBUTION

In reply to Mr Eken's "issue taking", I would like to correct his apparent misconception that in my remark concerning costs of these vessels increasing beyond the rate of inflation, I was criticising the builder. The remark was directed at the ineffectiveness of the forms of government assistance, be it through recognition and subsidy or registration and bounty. The additional paper work and lost time for tendering through the Shipbuilding Division and the frustration of owners in decision making while awaiting subsidy/ bounty determination, has in no way improved the efficiency of the small ship shipbuilding industry, which in the unrecognised section prior to 1972 was competitive with subsidised Australian yards and in some instances international ones.

However, Mr L. Glover's bold paper and presentation spelt out the deficiencies of the present system ably and I do not consider it necessary for me to expound further, but rather to endorse my already spoken support of his general theme, that the new names of 'registration' and 'bounty' will do nothing more for the industry than 'recognition' and 'subsidy' have done for the shipbuilders in the former 'recognised shipyard club' that are now no longer in business. Taxation benefits and monetary assistance he proposes will, apart from making the taxpayers' dollars more efficient in building ships, remove the psychologically debilitating effect on the industry of the dole - charity handout of subsidy or currently bounty.

I take issue in return with Mr Eken's statement that I glibly group seven vessels into one class on the basis of hull shapes alone. Actually, I grouped and submitted six vessels which were virtually identical - and that over a two year and five month period, their price had increased in the order of 70%.

I reaffirm the identical nature of these vessels, particularly in relation to the tender prices listed in Table 7, since these prices did not take into account one principal item that accounted for lightship weight variation - gantry crane and tracks, this being the subject of a separate negotiation.

The accommodation arrangement and outfit for all ships was identical and for the six ships the main engines were identical, but with the four subsequent to the first two, the same engines were uprated 4 x 50 PS. In addition to the other items of variation mentioned in the paper, i.e. bow thruster, auxiliary power units and deck winch, mention should be made of the windlasses which were also upgraded after the first two ships.

The following tables illustrate the price changes in these items. The remarkably small increase of 4.08% over six ships in the principal item of main engines is noteworthy. The auxiliary power increase is not so severe as it looks when adjusted for the lift from 466 kw to 600 kw. After the specification variation of 3-drum winch in lieu of 2, the increase from 3rd to 6th ship of 6.95% cannot be considered unreasonable. It is significant to note

that the sum of all these tabulated items for Ship 1 is $430,168 and for Ship 6 $544,992 - an increase of 26.7% which covers specification change and inflation.

Vessel No.	Main ø Engines	Aux. ≠ Engines	Bow * Thruster	Tow * Winch	Deck Mchry. Package *
1.	$239,415	$52,074	$24,248	$ 93,776	$20,655
2.	239,415	52,074	25,647	98,881	20,655
3.	244,350	70,080	29,160	128,227	48,585
4.	243,915	70,080	28,560	128,227	48,585
5.	257,282	70,080	31,414	134,898	51,627
6.	249,180	70,080	32,898	129,722 + rig cable lifters - 7,450	55,662
7.	380,000	70,080	35,216	160,860 + rig cable lifter - 9,500	59,507

* Prices - courtesy of Carrington Slipways Pty Ltd.

ø Into Shipyard cost

≠ Prices - courtesy of Waugh & Josephson Pty Limited.

It serves no purpose for me to analyse Mr Eken's weight grouping costs and question his inclusion of shipyard fabricated steelwork such as 'A' brackets, nozzles and sterntubes with factory manufactured diesel engines. These items are far too far apart in character to be treated with the same rate/ton factor. Carrington's costing is grouped differently and can't be related to Mr Eken's particularly since its basis for the first two vessels is a steel hull weight of 482 tons at $828 per ton. Whilst steel weight went up, the main machinery weight for the seventh vessel with increased power went down.

There is no official recorded inflation rate, however, the consumer price index must give some pointer to inflation and so, from CPI Valves, an inflation rate is deduced in the following table:-

Fiscal Year	CPI	Deduced Inflation %
70-71	114.6	
71-72	122.4	6.81
72-73	129.8	6.05
73-74	146.6	12.94
74-75	171.1	16.71

Note : Year 66-67 was base year of 100.

Even allowing that the CPI perhaps does not cover a wide enough field of items to truly measure inflation, I believe the above deduction serves to indicate that the 7% and twice used 20% applied by Mr Eken over the time span of these vessels is somewhat heavy.

I am consequently not persuaded from my view that these vessels have increased in price beyond the rate of inflation.

If, as Mr Eken asserts, there was a simultaneous design for Tidewater Port Jackson of the same arrangement concept as the Sarah Class and this is attributable to a Tidewater Port Jackson Director, then he is to be congratulated on the concept. I recall 1970 as the year we had no commission from Tidewater Port Jackson since we suffered from the competition of an overseas consultant and we lost Tidewater Port Jackson as a client at least until 1974.

In 1971 I was not acquainted with Tidewater Port Jackson's activity when developing the Sarah Class and it was not until 1973 that the Tidewater Port Jackson design was published. It was gratifying in 1973 when Carrington were building the sister ship to the Tidewater Port Jackson design alongside the Sarah Class to be advised by the builder that our larger design was more economical to build. If Tidewater Port Jackson claim full marks for the concept, maybe we can claim some for the execution.

When you hear one supply boat company superintendent forcefully expound his opinions on the merits of chines, vis-a-vis double chines and round bilges and segmental pipe fenders against Vee-form fenders, you wonder how the other company, whose superintendent insists on the opposite features, can stay in business. However, I doubt that supply boat design will only serve one type of rig and conseauently, every aspect of mooring and coming alongside must be considered to minimise the damage that is part of this hazardous shipping industry.

I endorse Mr Eken's comments in respect to the support received and knowledge passed on by the people with whom we have worked and would hope that others not mentioned to whom we are beholden will not take offence. A list of names can never be complete and perhaps it is fair comment here and now to say that some shipbuilders have contributed to our education more than somewhat.

With development of the supply boat into higher powers, larger bollard pulls and greater and more complex cargo combinations, stability books - with more than some little encouragement from Department of Transport - have of necessity improved. It is conceded that the contents of 4 and 5 tanks serve as a ballast effect and must be discharged as drillwater only after the deckload. Situations of loading and unloading sequences being necessary in other ship cargo operations are an everyday part of ship handling. That Mr Eken has felt the need to make this point could be a consequence of a land originated industry, whose purpose is continuous drilling of a hole in the earth at sea. This involves equipment of such fabulous cost that the thought of stopping long enough to understand the sea effect on the relative low cost item such as a supply vessel has not in the past been bourne. The industry has, through time if not inclination, been educated by the sea environment and I doubt now that an AOS master would or could be persuaded by the drilling boss to provide water when he has a substantial deckload in an unloading

sequence prejudicial to the safety of the vessel. I see no real risk in the unloading situation relating to Condition 7; more so in the loading if the master was casual enough not to do some sums. Without the 'drillwater' going in first as 'ballast' he won't be carrying the deckload to the rig.

I had thought that my remark on commercial pressures in respect to trial measurement accuracy would have forestalled enthusiasm for analysis of trial results, however, I should have known that Mr Eken's propensity for mathematical deduction would not allow the information to pass unexamined even if, as it appears, unscathed.

For his information, I would advise that the fuel consumption given in the curves related to main engines only and so no assumption or correction for auxiliary power was necessary. However, as a balance against this whilst his assumption of 16 kg/hp/hour is about right for each main engine for flywheel horse power, for metric SHP at the gearbox coupling the specific fuel consumption is 173 gr/ps/hr. This figure goes considerably to closing the gap through using .16 and deducting auxiliary power.

Having regard to trial measurement accuracy, I can have no argument with Mr Eken in respect to the order of wake and thrust deduction factors he has deduced. These figures, both for wake and thrust deduction, are higher than one would obtain from Taylor or Schoenherr (Rossell & Chapman) formulae, however, these formulae were not meant for supply boats. The factors deduced more nearly approach the mean levels indicated in W.A. Crago's paper (Coscon 74), based on results of testing of supply boat forms by the British Hovercraft Corporation.

COMMENT - MR TURLEY (Dodwell & Co.)

Perhaps I might be exposing my commercial instinct when I raise this question of costs:-

In Mr Doherty's paper, he does quote cotss of various vessels of the series, perhaps you could add what are the reasons for exposing the costs. Is it purely academic or is there some purpose for this.

What proportion of the increased costs can be attributed to the increased specification requirements?

Can the cost increases be attributed to the fact that the builder, (John Laverick may be able to answer this) anticipating further orders may have tendered a low price in order to get further orders.

REPLY - MR J. DOHERTY

In respect of Mr Turley's questions, what was the main purpose behind the inclusion of this cost analysis? I think I did in the conclusion IV-70, hint at the fact that I am indicating there that there is something other than escalation due to causing the increase in cost of the order of 29% per annum. I do not think you always can pin down these percentages very closely - there are a lot of

things that you cannot find out. This is getting back to what was talked about yesterday, I think there is a cost increase in the small ship industry - beyond what you would expect from escalation. These other questions that are brought forward certainly can contribute tp variations in the cost of the vessel. As near as sister ships can ever be sister ships, this series has been so. The first two vessels were identical. Following the first two vessels, 2 changes were made: the bow thruster was increased in power and that did cost more money - I cannot pull a figure out of the air as to what difference there was in going from 200 horsepower to 300 - somebody from the organisation might help in that respect. The other variations in design after the first two was the main winch was changed in favour of a three drum winch and there is a fair cost increase in that piece of equipment. In the overall cost structure of the vessel, it may make some contribution.

The third question, can this cost increase be contributed to the fact that the builder anticipated further orders may have tendered a low price in the beginning even to the extent of possibly losing money. Well, John Laverick is a better one to answer that question, but Carrington have been in the business a few years now and certainly going back to our earlier times when in 1963 they were putting in prices of the order of anything from 30 to 50 percent underneath the recognised shipbuilders, have been going broke with low prices very successfully for a number of years! And, anyway, he will be better able to say whether his company was prepared to commit itself to the construction of two supply boats at $2,800,000 on fine margins.

Imported items of equipment subject to escalation : that is true, the principal item of important equipment is the main engines, which, I have in my mind the initial price and probably Mr Turley can then answer his own question. The original price of the engine installation is $210,000, two main engines per shaft, including gearboxes, controls - a complete engine package. That was of the order of $130,000 underneath the top price. Perhaps I have not been specific enough in answering Mr Turley's questions on this cost analysis and perhaps more work should be done, but that may be taken up later, at the moment I am afraid I have got to leave the answer at that level.

COMMENT - MR RILEY ON MR DUMMETT'S PAPER

In his interesting and informative paper, Mr Dummett has set out to show that the solution for increasing the pull of an underpowered tug is to fit a Towmaster nozzle, which I understand is covered by patents granted to his parent company and as a result, I am wondering whether his views on the subject are completely objective.

In making out his case to substantiate the use of this type of nozzle, he has made certain assumptions and constraints which I feel need closer inspection to ascertain whether these are really valid in this instance.

Firstly, let us consider the assumption of draft limitation made by the author, when comparing the bollard pulls of fixed and steering nozzles.

For Australian ports, such a limitation is unwarranted since the drafts of the vessels being towed are far in excess of the drafts of the tugs in these ports. Therefore, whether the draft of the tug under consideration is either 12 ft. or 14 ft. is of little significance.

Having discounted this particular constraint, we can now objectively consider the relative bollard pulls for both fixed and steering nozzles of the same diameter.

As an example, consider a tug having a delivered horsepower of 2000, a shaft R.P.M. of 200 and a propeller diameter of 10 ft. For a steering nozzle a bollard pull of 33 tons could be achieved without much trouble.

With a fixed nozzle attached to the hull and with multiple rudders as proposed by the author, the pull will be somewhat less for two reasons:

(a) Reduction in thrust from the nozzle due to its attachment to the hull. This is discussed in refs (1) and (2).

(b) Reduction in thrust due to blockage of the exit by the multiple rudder configuration.

We have estimated the loss in bollard pull due to these two factors will be in the order of 3 tons, i.e. about 9% of the bollard pull of the steering nozzle. I believe such a reduction is being optimistic when compared with the results published by Van Gunsteren in ref. (2), in which he states the bollard pull on a 500 H.P. tug fitted with a nozzle attached to the hull with a closed box construction was 6.9 tonnes, whilst with a complete ring nozzle fitted, the bollard pull was increased to 7.25 tons, thus giving an increase of some 15% to the complete ring nozzle system.

Now let us consider the relative merits of the steering characteristics of a fixed nozzle with multiple rudders of the Townmaster type and a steering nozzle arrangement. The author claims that the former arrangement is superior to the latter.

It is interesting to note in ref. (3) that the results of independent tests show the reverse to be true in that the vessel tested had a smaller turning circle when fitted with a steering nozzle than when fitted with a Towmaster type nozzle.

Perhaps the author would like to comment on this paradox:

He has written much in his paper about the increase in lift using the multiple rudder concept as opposed to a single rudder behind the nozzle. I agree with his general conclusions, but would question the validity of the lift coefficients claimed for the multiple rudder configuration on two grounds:

(a) The flow over the aerofoils behind the propeller is not straight as it would be in a wind tunnel;

(b) There appears to have been no allowance made for the cascade effect occurring between the shutters.

Could the author say whether these effects have been taken into account in fig. (3) of the paper?

In making out his case for the use of the fixed nozzle and multiple rudder configuration, the author has only compared the steering characteristics with a steering nozzle. Perhaps it would have been useful to also compare the effects on steering using a steering nozzle and flapped rudder as described in ref. (4) and ref. (5), behind the nozzle.

In concluding my remarks, I note in the conversion of the "Abeille" a four blade kaplan type propeller was used. Since 1972, this bare foot colonial type naval architect has been using another series of propeller on all our designs fitted with nozzles and as a result we have been able to increase the bollard pull by about 8% above what could be expected if a four blade kaplan type propeller had been used.

References:

(1) Van Manen J.D.

"Recent Research on Propellers in Nozzles". Journal of Ship Research. July 1957.

(2) Van Gunsteren L.A.

"Some Notes on Ducted Propellers." Believed to have been published by Lips Propeller Works. February 1970.

(3) Munlgewerf J.J.

"Model Tests with Nozzles for Trawlers". Publication No. 264 of the Netherlands Ship Model Basin.

(4) Anonymous

"Articulated Rudders - Past and Present. Modern Application of Lumley's 100 year old Flap Rudder Design." The Naval Architect. January 1974.

(5) Bardarson H.R., Wagner-Smith L. and Chislett M.S.

"The Effect of Rudder Configuration on Turning Ability of Trawler Forms. Model and Full-Scale Tests with special reference to a Conversion to Purse Seiners." Transcations of the Royal Institution of Naval Architects, Vol. 109, No. 3, 1967.

REPLY - MR DUMMETT

As far as the use of towmaster with a capital T is concerned, I must point out that in this upgrading of tugs, I used this as an example. There are many other ways of upgrading tugs and the type of obsolete tug which requires upgrading.

This upgrading can be done in a number of different ways equally effectively. Maybe, judging from what you said, you would

not want to use that method I was combining in the papers of shutter rudder system and also the way in which it is economically viable to upgrade tugs which require their performance improving. As far as the limit on draft is concerned, I realise that this might look a little like a red herring and in some ways it is.

Obviously if you increase the diameter of your steering nozzle to a point where it is the equivalent of a fixed nozzle, then you are going to get a similar performance out of it. I toyed with the idea of trying to show that, I do in fact refer to it in the text. I point out that this is the case but when I drew that figure up with the thrust at zero helm angle equivalent, it was difficult to differentiate between the curves and it was easier to show it on the basis of equal draft, in other words, with the limited diameter of the propeller in the steering nozzle.

I think you would agree though, that in many cases when we say we are comparing something on the basis of equal draft doesn't necessarily mean that there is a draft limit on the vessel. It may be that you don't for other reasons, want to have an excessive draft on the vessel, and you don't wnat excessive depth in the vessel.

Naturally, if you are going to have a steering nozzle you do require to obtain the same propeller diameter as with the fixed nozzle. I am interested to hear the figure 6.3 tons for the fixed nozzle, 7.25 tons for the steering nozzle. I have not seen this and I would be most interested to look at this.

As for where our information comes from - it comes from model tests with these configurations and also from trial results of known vessels, of which we have a number of similar designs to be given alternatively with different types of nozzle configurations and with similar powers.

You did not elaborate on the type of propeller that you are fitting. You say that the Kaplan blade is found to be an alternative which gives a better performance in a nozzle. Once again, I would be interested to hear more about that, but may be I never will.

I would also like to reply to a written question which I had from Neville Abbot. He says, tugs of bollard pull 20 tons are not obsolete and if they are used correctly on servicing ships, are very seldom extended beyond half their actual available horsepower. We are, of course, directly referring to harbour tugs.

Question - 'In view of your comments on the 1st, 2nd and 34d paragraphs to your introduction, what do you consider is the necessary required bollard pull for a harbour tug?'

2nd Question - 'In view of your comments on page 77 upgrading of obsolescent tugs, are you suggesting that these tugs, which when handling the types of vessels in service, then have become unhandy and hard to control in later years?'

I agree, that 20 tons bollard pull tug is not necessarily obsolete. In certain circumstances, it is not obsolete. However, I think everyone would agree that the tug in the 120 to 130 ft. length range, with a 20 ton bollard pull and single screw open

propeller tug is virtually obsolete in the sense that there are very few of them being built. This could be partly fashion, because fashion does play quite a part in design and of course, as you would know, sales appeal.

I don't think that the high powers that we are putting in tugs these days are necessarily justifiable in terms of the work that they have to do. Obviously, the reserve power that you have is useful to help the tug master and get him out of trouble. But of course, there is also danger in having such power in the rather lighter displacement tugs we have these days.

In fact, Mr Herd's comments on stability has been one of them and unless you are prepared to fit controllable pitch propellers non flexibility is the whole concern, since you get fluctuations of 5 or 6 tons bollard pull which you don't want but which you can't avoid.

You ask, what do I consider is the requirement for bollard pull? I think this is a matter of what is required by the market. In other words, if you find, as a tug operator, that you need a tug in the 30-40 ton bollard pull range, in order to get the work - not in order to do the work, but in order to get the work, then, I suppose, that that becomes the requirement although it may not be strictly necessary to do the large majority of the work which you have.

You ask if they become any less manoeuvrable? Of course, obviously, they haven't become less manoeuvrable, but by comparison with some of the modern styles of tugs with the steering right angle drive and so on, they are less manoeuvrable and tugmasters and pilots like to have this capability and so presumably once again, it is a matter of sales appeal and what you need on your tug to be able to sell it in the market place.

COMMENT - MR BODEN

I notice that we are running about 10 minutes behind time. My apologies for that.

We will take a moment or two to deal with the last paper, one by Professor Paulling.

I should like to start the discussion by referring to two diagrams, 5 and 6 on pages 99 and 100, merely to ask the question whether perhaps there is a misprint. It would appear from the diagram No. 6 that the righting arm with the crest amidships is the lesser of the two between the crest amidships and the trough amidships, whereas on the diagram No. 5, it would appear as though the curves are noted to be reversed. I am wondering if we can have a clarification of that.

REPLY - DR L. DOCTOR

The reason for that error is quite simple. Professor Paulling stated after a few months he got completely mixed up - which way was up and which way was down when he came from the United States. That is correct, the crest amidships should be labelled trough amidships and the trough amidships should be labelled crest amidships.

I have not looked at figure 6 in great detail, but that is correct.

COMMENT - MR DICKSON (Sydney Technical College)

I am going to talk about a missing link.

It is interesting to have a stability paper. We have heard a lot about stability over the past few days. Particularly what I'm referring to is, in this modern age, you go aboard a ship and you see a tremendous instrumentation, there are alarms for everything. We haven't got an alarm yet for stability. We get alarmed in the office for stability, but what I was referring to is that with all these parameters we have for still water stability and in Professor Paulling's paper for wave stability, surely our University here as a research project should work on this one - where we can put an indicator or a series of indicators on the bridge front, which will tell the ship user when the danger occurs due to a rise in G or a lowering of the metacentre.

I'll throw this one to you, Doctor. As a good research project. I have been thinking about it for years, but I have not got enough background in instrumentation. I think that this is where the matter lies.

MR BODEN

I would like to interpose there. Surely, if that indicator was there the ship would not go to sea!

REPLY - DR L. DOCTOR

Certainly the suggestion is a very good one. Of course, when a ship puts to sea, the master is supposed to calculate the centre of gravity and the metacentre and so forth.

WRITTEN COMMENT - MR ARMSTEAD

It is most interesting to have a further paper from Professor Paulling for discussion at this symposium. The subject matter is so often grossly misunderstood and misinterpreted in this country.

I was delighted to read the author's comments on the misleading use of GM as a sole indication of stability in low freeboard vessels (Page IV-88), being one of the few people among the staff of the statutory bodies lending support to the author's opinion. There are numerous references where similar warnings are provided, all backed with ample evidence of the pitfalls and consequences involved.

For example, the author refers to a paper by Storch (his ref. No. 7). It is not only relevant to the author's particular comment on flooding, but also contains the words:-

> "A high initial GM could give a false impression of satisfactory stability over the normal range of heel angles."

Surely these and other cautions will be heeded and appreciated by that school of thought presently advocating the use of GM as a

criteria for determining the stability of small passenger vessels.

Following the publication of another paper by the author in F.B.O.W. Vol. II - "Transverse Stability of Tuna Clippers", the Maritime Services Board investigated the stability of an extremely low freeboard vessel then being fitted out for tuna fishing on the basis described in the paper. Shortly afterwards, Boden & Halliday wrote a paper "Computation of the Transverse Stability of a Ship in a Longitudinal Seaway".(T.R.I.N.A. 1964). This latter paper used the same vessel investigated by the M.S.B., with similar results, these naturally giving the same order reduction of stability indicated by Paulling.

The amount of work required for the manual calculation of this vessel's stability was enormous and would be at present out of all proportion both time and costwise. However, with the aid and convenience of the computer systems now available the amount of work and cost can be dramatically reduced. The programme now used by the M.S.B. permits change of trim during inclination to be taken into consideration and it is also relatively easy to allow for the wave profile effects described in this paper.

The need for closer investigation of stability is not always appreciated, especially in the fishing industry. This is partly the result of the practice for vessels in this country to be "built" rather than "designed". Local consultants are frequently presented with a complete or nearly completed vessel and asked "what is the stability?". Too often it is found that vessels do not meet the minimum statical/dynamic criteria required and extreme difficulty is then encountered in rectifying the situation.

I am convinced we are about to see changes in the approach to ship stability, which for years has been on a statical basis. The change when it comes will be sudden and hard to envisage for some people so hidebound by the present approach that has not changed substantially since first enunciated.

I regard Prof. Paulling's work to be in the vanguard of this new "school".

WRITTEN COMMENT - MR D.C. KEYES (Tasmanian Transport Commission)

I speak as an ex seafarer and as a manager.

My comment is related generally to the question of design, and it is a plea that designers should make every effort to go to sea for short periods from time to time in the types of vessels which they are called on to design, or at least talk to their crews.

The greatest single cause of complaint about those impracticalities of design which are sometimes encountered, and these mostly relate to layout, is the lack of opportunity for the users and the designers of vessels to communicate. By users, I mean crews, whose problems are often different to those of management.

It is not enough to rely oh the shipowner to arrange these contacts when orders are placed, and if these problems are to be overcome, and as they reflect on designers, it appears that the initiative will need to come from members of the profession.

MR BODEN

Well gentlemen, I'm sure it has been very interesting discussion and we are very grateful to all the people who have presented papers and to those of you who have come and contributed to the discussion.

THE BUILDING OF SMALL SHIPS IN AUSTRALIA

CO-ORDINATOR : MR E.S. CLARKE

Department of Transport
Sydney

Mr Clarke introduced the panel, thanked the authors for the time and effort they had put into the preparation of the papers. He also thanked Mr Cecil Boden for standing in on the panel in place of Mr A. Swinfield who was unable to attend and Mr Derek Lee of Halmatic for coming all the way from U.K. to act on behalf of Mr Dove.

The following lines from Longfellow were quoted in relation to the building of ships:-

> "Build me straight oh worthy master,
> Staunch and strong a goodly vessel,
> that will laugh at all disaster,
> And with wave and whirl wind wrestle."

STEEL CONSTRUCTION

Question - Mr Ross Hawke (Whyalla Shipyard)

Mr Hawke drew attention to the words on page V-12 of Mr Verboon's paper "In other words yards should not build vessels that they are capable of building but they should build vessels they can build especially well". He agreed with the sentiment expressed although Whyalla does consider it can build all types of ships particularly well. Whyalla was equipped to build big ships but the market for such ships had collapsed throughout the world. Japanese shipyards "geared" to build very very big ships are now reduced to building very big ships; the shipyards equipped to build very big ships are building big ships and so on down the scale. Likewise Whyalla was forced to tender for any type of ship offering.

He asked Mr Verboon to comment on the market for his type of ship and how he is going to compete with "John Laverick's" when they come down the scale. Although it is admirable to have a shipyard which can specialise this does not seem a practical proposition in these times.

Mr Dick Verboon said that for a greater productivity there was no question that there should be standardisation. He agreed there were difficulties in achieving this and although not sure how to go about it he believed that there must be a degree of Government support, e.g. export incentives which would enable yards to standardise on one or two types of vessels. The world market should be big enough to cope with this. Subsidy could be on a sliding scale downwards e.g. 25% to start with, diminishing to say 20% after a few years and finally, with satisfactory markets, winding up with no subsidy at all and builders being happy with it. His yard could tackle the market for 2 or 3 types of trawlers and build nothing else but these. In this case they could doubtless do with no subsidy at all.

His own Company was expanding its capacity and approaching the "John Laverick" area. The whole situation was very sick and a solution must be found especially towards standardisation, otherwise we will not have a shipbuilding industry at all.

Mr John Laverick said that the design of his yard was based on flexibility. Geared up to build tugs and other standard designs and anywhere between 15 and 18 of these a year. This of course would very soon result in saturation of the Australian ports with tugs. Therefore the long term market was not there. Carrington had an aggressive marketing policy in the Middle East and are trying to sell their tugs all over the world. They have been tendering in U.K. where their prices were competitive but the reality of gaining these orders was another thing. The Japanese onslaught was a great problem and nobody can match them. They will "buy" work and in recent cases in the Middle East Carrington found that they could not even buy the material for the prices quoted for vessels by the Japanese yards.

Their yard is laid out on a "flow line" principle described in the paper, giving efficient flow of material but allowing flexibility. This enabled them to cover all vessels in the small ship field as is necessitated by present shipbuilding scene in Australia.

There seemed to be two ship types offering in the future, firstly the repetitive type ships such as fishing vessels, tugs and offshore service vessels. Then there were the specialised vessels such as fisheries research.

A yard must have the "in house" or consultant capability to liaise with owners and develop appropriate designs.

Question - Mr Brian Chapman (Whyalla Shipyard)

Mr Chapman asked Mr John Laverick:

- How much they had spent on the new shipyard?
- How much they plan to spend on further developments, as he assumed it was not regarded as a complete yard at the moment, and over what period?
- What was the source of funds for this extension e.g. from internal cash flow?
- What pay-back period did they plan on?
- What proportion of the workforce is used on production planning and control?

Mr John Laverick said that one of the advantages of a family Company was that one can have a directors' meeting, a shareholders' meeting, management meeting and a family argument all at one time. This saves a lot of time and a lot of cost.

Because of this Carrington's approach to business may be a little different and more flexible than bigger companies can manage.

The cost of the new yard was about $1½M.

Plans for the future; The Tomago property was 285 acres, not all of which could be used because of swamp. It should be remembered that Carrington, as with Whyalla, is the only "pure" shipyard in Australia. The Company had decided, because of the interference of repair work with new construction, to give away repair work and concentrate on new construction. Therefore the Company had to make a success of new construction. It believed that it could offer more specialised expertise in the field including guaranteed deliveries which they have been able to achieve over a considerable period.

Further extension would be continuous and on-going and would be financed from profits, as funds allow, though with a private Company, 75% of profits go in tax.

Carrington had the first numerical-controlled plate cutting machine in Australia which would be installed shortly. It should give far greater speed of cutting and accuracy in steel preparation. On the other hand they could not afford to risk over capitalisation. They had "picked the eyes" out of what they had observed in shipyards overseas. They were looking to new welding processes, alternative methods to machining and not least to design for economy in construction which is being investigated with their naval architects.

For a private Company accommodation by one's bank is very important.

Regarding pay-back period Carrington's policy was for loans for set periods and to pay back as quickly as possible.

On production planning they had two people on critical path scheduling but had no design staff as they depended on consultants. They have a detail drawing office who draw the build up of modules, pipe runs and other such details - about five draftsmen and apprentices, the latter always having a period in the drawing office. The production manager and the production crew decided the break-up of the ship in relation to crane cover and the production programme. They ran ships in parallel and endeavour to keep the steel work flow constant and vary the other services to suit this.

Question - Mr John Jeremy (Cockatoo Dockyard)

Mr Jeremy spoke of the diminishing market and the need for all shipyards to search out orders for any type of ship and that this acted against the aim of specialisation which had been said many times over the past 10 years to be the aim of all shipyards. This drift threatened the further contraction of the industry because the overheads and expense of building a ship like the C.S.I.R.O. Research Ship were vastly different from those for a prawn trawler, or tugs. While he could understand why the industry was looking at everything and trying to find something, he felt that this in itself was self-destructive of the industry as a whole. He sought comments on this view.

Mr Dick Verboon agreed with Mr Jeremy. Nevertheless the majority of vessels are standardised, including vessels for Navy to a greater or lesser extend and incidentally the latter should standardise on ordinary commercial vessels if they possibly could. He felt that 80% of vessels could be standardised, otherwise the cost would go up instead of down or at least hold stable. He concluded by repeating that we must specialise and standardise.

Mr John Laverick raised the question which did not appear to have been discussed yet of the future of the Australian Shipbuilding Industry as a whole. The diminishing order book was one thing but he felt that an equally important matter was the Shipbuilding Bounty Act which will determine the future of the industry in Australia. The provisions of the Act must therefore be understood and faced up to or the industry would be threatened with inevitable reduction.

ALUMINIUM CONSTRUCTION

Question - Mr Roy Cornell (Office of the Purchasing Commission)

Mr Cornell referred to the aluminium patrol craft at present being built to an order from his office. He wished to make comment about the construction of small craft as distinct from small ships and confined his remarks to vessels below 75 ft. The two classes of vessel he suggested required different approaches both technically and financially. Small patrol craft e.g. those for anti-smuggling activity have been in construction in Australia for some time.

Specifications were drawn up and the conclusion was reached that the best material for such patrol craft was aluminium. He felt that the skills in building aluminium had developed greatly and also there has been success with aluminium assault vessels which had been supplied under aid programmes.

Some opinion was expressed that the Commission should go out on a design contract and then later call tenders for construction. There were difficulties in this and as far as he could see there was not much benefit as far as the customer was concerned.

He felt that it was very difficult to establish a viable small shipbuilding industry in Australia or more generally even a shipbuilding industry. There had always been a need for Government subsidy, no-one was prepared to pay the premium and it appeared to him that it would always be that way. On the other hand with small craft there was a profitable aspect to the industry and he believed that there was a higher demand for small craft. There was a bigger general investment and there were less inhibitions in the small craft industry regarding new materials, new methods and other innovations. There was the promise of small craft developing in an ever-increasing role.

Greater use could well be expected in the Navy field for example. He said that small combat craft had put larger vessels out of action in several parts of the world. They were capable of carrying and launching missiles and it seemed that the operators of such craft would have to give much more consideration in the

future to the use of small craft as against those they have been traditionally used to. He sought comments from Mr Simmonds on these points in relation to increasing the role of small craft in the future in fisheries, surveillance, anti-smuggling etc.

Mr Simmonds suggested that the surveillance picture today was that we were not combating an enemy with sophisticated weapons and large ships with high speeds. The surveillance role today is one related to fishing boats of slow speed with no sophisticated detection equipment, therefore unaware that patrol craft are coming. He is just as adversely affected by bad weather as the patrol craft. It does not need an "Attack" class vessel of 130-140 ft. and 35 knots and gas turbines etc. to intercept a little Japanese fishing vessel. There are also aircraft to assist in detection.

Smugglers operate not only by day but also by night and therefore it is essential to have good detection equipment on board. The modern equipment is very reliable and does not require much power so that it can be fitted in small craft. With such equipment and a reasonable pursuit speed, and if you can combat the sea conditions appropriate to the aggressor, then that is all you need in the peace-time scenario.

Undoubtedly there is a role for small patrol vessels of which he had had 20 years experience but he did not see this as appropriate to the peace-time surveillance task. Such surveillance vessels should be small, manned by a few highly trained men capable of sustaining its sea-going function or "living off the land" techniques. It does not have sophisticated shock mountings but has equipment that are readily available from commercial suppliers and above all able to get back to sea promptly after repairs have been completed.

Mr Derek Lee commented on this matter in relation to Halmatic's extensive experience in this type of craft. They had a line of life boats up to 55 ft., pilotage boats up to 60 ft. and police boats and small patrol boats. Some 4 years ago they were almost only building yachts but had now almost completely changed over to the above working vessels.

Question - Mr W. McAlister (Government Surveyor, W.A.)

Mr McAlister drew attention to differences between slamming pressures quoted in the GRP paper as compared with those in the aluminium paper. Figure 5 of the former indicated 5-6 ft. waves and a speed of 28-35 knots. The table apparently gives figures which will be twice the values by Heller and Jasper. He sought comment on this in relation to figures being used for design. He also commented that an aluminium abalone vessel which he surveyed had transverse frames forward of amidships and the welding was cracked due to slamming.

There had also been a recent trend towards the use of flat bars for transverse and longitudinal framing in preference to angles. He believed that the small boat builder or designer was not sufficiently aware of the modulus that is lost by omitting that flange. He frequently found that the modulus using flat bars

can be kept reasonable and there is a minimal chance of the flat bars tripping. On larger vessels with flat bars up to 4" deep to get the necessary modulus, he tended to use angles or tees. On the other hand flat bar has many advantages and that is why it is used on small boats.

Mr Last said that whether flat bars or other sections were used depended on the framing system. If framing were longitudinal with deep transverses there was no particular problem. On the other hand with bigger ships and deep sections flat bars tend to shed their load.

Mr Lee said that scantlings for his GRP vessels depended on three criteria:

- empirical, based on a number of years experience and a large number of hulls produced
- tests using strain gauges in various wave heights
- scantlings to the requirements of the classification societies.

Mr Rivett referred to page 68 of the aluminium paper and drew attention to a misprint in table 1. The UTS's should be in lb in.$^{-2}$ and not in lb m^{-2}.

Mr Allan Ramshaw suggested that the great virtue of aluminium construction, namely its lightness, was greatly diminished by the reduction of strength in region of welds as referred to on page V-68 ("the substantial loss of strength which occurs on welding"). He sought comment on how this could be overcome and what steps were being taken to improve the ratio of weld strength to parent metal strength.

Mr Lund referring to the loss of strength at welds, said that they had to design on virtually a minimum condition and also to ensure very careful design with welds placed in areas of minimum stress. On the other hand welding after construction had to be borne in mind e.g. attachment of unforeseen brackets or modifications.

Mr David Eyres commented that in New Zealand there was a great problem in the recognition of aluminium qualities as aluminium manufacturers seemed reluctant to mark their products with indications of strength.

Mr Rivett said the marking of plates was quite easy and was insisted on in Government departments e.g. Navy in Australia. It was done by stencilling. Aluminium alloys were not normally stamped but this could be done if requested and a certificate given to prove the material as supplied was as requested. There was a cost increase because it took man power to do it. Regarding the reduction of strength at welds this was mainly overcome by appropriate design and it was necessary to have a design department in conjunction with construction. He confirmed Mr Lund's comment that it was necessary to have the welds placed in areas not under heavy stress. The strength of aluminium relates to the modulus of elasticity in the weld zone. It reverts to its "O" temper and this affects its strength against deflection or permanent distortion.

However, the strength of the supporting structure should overcome this.

Mr Simmonds said design must take construction into account and this comment was relevant to the question to the use of flat bar as against other framing sections.

Mr Don Gillies referred to page 70 of the aluminium paper in regard to cathodic protection. He sought comments on the metals used for anodes and the placing of them.

Mr Lund said that zinc anodes were used and it must be of a very high purity, if not they could be worse than useless. Aluminium/magnesium had been tried in tests by independent consultants and these showed that zinc was the best material.

Regarding the placing of anodes, several were used along the transom which was usually flat, making this easy. Although additional anodes in areas adjacent to propellers and rudders might be desirable, this adversely effected resistance and therefore anodes were kept out of the flow line. The above protection had proved very satisfactory on several vessels over a number of years. Additional anodes were used (carried on deck while under way) when a vessel was moored, proper bonding being essential.

GRP CONSTRUCTION

Question - Mr Frank Last

Mr Last sought advice on a number of matters.

- What was the ultimate life of a GRP vessel especially in view of the difficulty of repairing GRP?
- Could an existing GRP vessel be classed especially because the conditions of the original cure were difficult to obtain?
- How did the cost of a GRP fishing vessel, for example, compare with aluminium or steel?
- In relation to the likelihood of high humidity and low night temperatures obtaining in Australia which could adversely effect the adhesion of future skins, he sought comment on the need for appropriate controls.

Mr Lee said the life of a GRP vessel was uncertain at present but two years ago Gibbs and Cox gave a paper on a US coastguard craft of about 50 ft.which had pieces cut out and subjected to laboratory tests. This showed minimal deterioration. His Company had experience of several 50 ft. craft of up to 20 years age and these were still very satisfactory, suggesting that at least 20 years is a reasonable life.

Regarding osmosis causing blistering of the hull, this did happen on a small percentage of fibreglass hulls, perhaps due to voids below the laminate. This took place between the gel-coat and the first layer and therefore did not affect the structural integrity. Therefore it could be repaired without much difficulty.

Regarding classification, no classification society would approve a GRP hull after it was finished, if they were not in at the beginning.

Lloyds U.K. issue to builders three codes of practice: tooling; workshop practice; moulding.

They were fairly large volumes and had to be compiled with if a builder wants a certificate at the end.

By simply looking at a GRP hull one could not tell if it has been correctly moulded. Certain tests could be done e.g. ash testing of pieces out of the laminate; but these did not indicate the moulding conditions at the time when it was made.

In 1978 there would be two European standards, one for boats up to 6 m length, the other up to 60 m, to which boats must comply. Policing of this had yet to be agreed upon but export of vessels would not be possible without conforming to these rules.

Mr Hutchinson asked what lay-up method was used by Halmatic. He commented that at the lower end, Lloyds Rules tend to result in too much material being used for small vessels.

He referred to the rather "back yard" type construction that many people think of in relation to fibreglass construction in Australia. He asked what training was given to operators in U.K. Were certificates issued to properly approved people?

Mr Lee said that Halmatic used what is commonly referred to "bucket and brush" and a single lay-up. They have not gone to sandwich construction.

Regarding training, in 3-6 weeks it was possible to train an operator to lay-up a single skin boat.

Regarding lay-up, he had no objection to spray method and commented that classification societies accepted this up to about 25-27 ft. On larger boats thickness control with a spray gun became more difficult. Personnel for machine lay-up require far better training than is normally available.

A Questioner (name not clear on tape) referred to Halmatic's visit to Australia about 10 gears ago to start building GRP vessels in Australia. These were laid up under Lloyds inspection.

Osmosis was a frequent occurrence and was detrimental to the industry. A boat on the slip which showed pock marks suggested reduction of strength. He asked what was the real cause of this, what was the method of curing it and what was the real reduction in strength.

Mr Lee said that at this time there was no complete answer on all aspects of osmosis. There had been symposia on it and it had been much discussed with authorities in U.S.A. It was known that it was between the first and second layers and was perhaps due to air voids in the moulding. Boats that were badly laid up and not in accordance with classification rules were likely to have a much

higher incidence of osmosis. The significance of it should not be over-stressed. Blisters could be pricked or chipped out and refilled and could be repainted for cosmetic purposes. His experience was that once it was corrected, boats did not return for later treatment.

Mr Tony Armstrong (Eken and Doherty) said that the paper quoted GRP construction as being unique in that the material forming the structure was made in situ as a homogenous matrix of glass fibre and polyester resin. While not strictly true that it is unique, it is implied that this is a disadvantage. There was a fourth method of construction referred to on page 37 which could be to advantage and could involve cost savings. That was the method of moulding sections and stiffeners simultaneously. The sandwich core method required sheer webs through the core material and the single skin approach required stiffeners to be fitted. The 150' mine sweepers HMS "Tupperware", as it was called, had stiffeners placed about 3½ ft.

The fourth method of creating the stiffeners and shell panels together produced the sort of thing that naval architects get very worried about - a longitudinally corrugated hull. The method was not new, the South Africans in the 1960's produced over 30 trawlers, about 74 ft. long, by this method. Did Mr Lee see anything against this approach?

Mr Lee said there were minimum cure times and the larger the hull moulding, the longer the mould time e.g. for a 40 ft. hull, they would not draw the moulding out under two weeks; an 85 ft. moulding would be left for 2 months.

With a single skin the laying up of the shell itself was straight-forward and not labour-intensive. It was the putting in of the subsequent frames to give the stiffness that took the hours.

Comparing these with sandwich construction, there was nothing against sandwich construction at all, except that if the thickness of the shell was divided with a sandwich in it, impact scantling was obviously reduced unless one of the outer shell thicknesses was increased. With the sandwich method, with girder type construction with the girders attached to both skins, cost was probably greater than with a single skin. The only advantage was that for moulding a single hull it was clearly better to use sandwich construction than to incur the considerable cost of tooling for single skin.

One of the advantages of a single skin was the fact that his company had developed great skills in producing tooling. Into a tool is put every conceiveable feature of the ultimate boat: every pad, boss, plinth, instrument console, the galley, the toilet module. It was no more difficult to lay it up and the result was nearly a complete boat where all the fittings were self located and easily put on.

Therefore if the tooling was amortised over a sufficient number of boats, the overall man-hours were very substantially reduced, in fact by hundreds of man-hours per day.

FERRO-CEMENT CONSTRUCTION

Dr Bowen, in an introductory comment, said that at the seminar in Wellington in 1972 Mr Tim Haggenback of Wynboats made the comment that "if God had intended that there be concrete boats he would have made concrete trees". This attitude prevailed somewhat because as a colleague said "Ferro-cement is really not a bad building material", and he is probably right.

This indicated the up-hill struggle to establish ferro-cement in its rightful place simply on the basis of some bad experiences in the past of which builders were very conscious. There were however, very definite opportunities in the commercial area.

It might be a sort of "Great Eastern" situation in that in our life time we would see more and more inroads into shipbuilding by pre-stressed concrete and ferro-cement.

A recent example which was probably well known as the $32 m LNG carrier in Indonesia where it was to be anchored. It was perhaps a unique situation. There would be more applications particularly in the stationary or semi-stationary situation where the deadweight penalty was not so important.

The whole field was wide open. The whole idea of ship "topology" as related to deadweight, stability, etc. is open to research effort. There was no parallel to the research opportunities in pre-stressed concrete or ferro-cement for use in vessel construction.

There was quite a lot being done in Australia in these areas, e.g. Mr Graham Tilley in W.A. with his pre-stressed concrete construction; secondly, Mr Peter Allan with his great initiative and courage with the "Helsall".

Events overseas included planing craft, patrol vessels, admittedly some of these being experiments.

Going over to hard chine shape immediately because of getting local flexures was not very appealing. Generous curvature seemed preferable - U.S. Navy planing craft built in ferro-cement suffered under appreicable degradation in performance compared with GRP. It might be wondered how someone might select a pre-stressed ferro-cement vessel in preference to steel or wood. The Jarkarta dry dock which was built in 1899 and was still good today might be recalled. The barnacles are scraped off occasionally. It was not pre-stressed; it was ordinary re-inforced cement and was certainly sound.

Ferro-cement was much cheaper sometimes, though not all that cheap, and it was fire proof. Preferential insurance rates are becoming available in New Zealand by some of the insurance companies for ferro-cement vessels. There was low capital investment in plant.

A New Zealand firm had two 628 ton pre-stressed ferro-cement vessels being built in Malaysia entirely by native labour under European supervision.

The disadvantage, of course, was weight, but this at least had the advantage of overcoming worries on ballasting barges on return voyages; but in general weight was the problem.

Captain Bolitho (Brambles Industries) sought Dr Bowen's comments on the use of ferro-cement in such vessels as dumb lighters where maintaining of them in service posed a problem.

Dr said that dumb lighters had been built fully in ferro-cement by Papua New Guinea Limited and similar barges were being built in Malaysia. Concern about chipping and resultant rust resulting from impact with piers etc. was understandable. The vessels being built in Malaysia were somewhat unique in that they incorporated a number of novel design features including the use of flotation cells. There was therefore a backing for the ferro-cement, certainly under the water line. The barge would float with all of the palm oil off-loaded and flooded. The backing provided tremendous impact resistance.

Performance of the other vessels the ribbed dumb lighters, was not clear.

The use of the fibres made by B.H.P., the chopped wire, eppeared to be quite a significant break-through as far as resiliency or crack arrest and impact resistance were concerned.

Regarding maintenance costs for such barges as against a timber lighter, experience with ferro-cement lighters in Auckland was that they simply were not maintained. Nothing was done to them. There was a log-carrier in Fiji which was not well protected by beltings and so on.

As far as general maintenance was concerned, the general feeling by the people who were buying barges was that there was simply no comparison with steel as far as maintenance cost was concerned.

Mr David Eyres said that the factor of abrasion and damage in service had mainly been a factor of design. It was most important to make suitable provisions by beltings and so on to provide suitable rubbing surfaces. If they were not, impact was certainly a problem.

Mr Ken Campbell said that the Cement and Concrete Association had talked about ferro-cement vessels at its annual conference. Mr Kevin Cavanagh, the Director, would no doubt be pleased to talk to Dr Bowen about it. They had a large organisation in Sydney and in each state and capital they had a civil engineer who was interested in promoting ferro-cement.

He asked what sizes of barges were being built, such as those in New Zealand and where they were being built.

Pontoons had been built in Brisbane 40 or 50 years ago, and were still in service. They had been "belted" by ferry boats across the river for about 50 years. They appeared to be quite strong and had lasted very well.

Dr Bowen said the barges in Malaysia were 628 tons. The barges in Auckland were about 200 tons gross. They were pretty heavy for their size. There had been excellent contact with the Cement and Concrete Association. In a N.Z. publication there were articles by regional engineers of the Association and there had been very good liaison with them.

Mr Dickson (Sydney Technical College) said that when he was with the Maritime Services Board he had learned that concrete pontoons had been put in at Circular Quay in 1913 for the Manly and Sydney Harbour Ferries to come alongside. They have been there for many years. They were proper civil engineering projects with "walls" about 6" thick and steel in the centre covered by a membrane of plastic. As a matter of history also the Queen, when she first landed in Australia, stepped aboard one of these at Farm Cove.

WOODEN CONSTRUCTION

Mr Hutchinson (Brisbane Technical College) said he would like to congratulate the sponsors for including a paper on timber construction and Mr Swinfield on the preparation of his paper.

In Queensland boats up to 100 ft. were built in timber.

As a traditionalist it was very good for him to be able to read about things like steam bent timbers, salt boxes etc.

Referring to the second last paragraph on page V-61, what evidence did Mr Swinfield have in saying "the art of wooden boat building appears to be dying out and few apprentices are forthcoming to carry on in the future?"

Did Mr Boden feel that the builders of timber boats approached the small construction as a craft rather than a branch of engineering science?

Mr Boden said he would be glad to pass on to Mr Swinfield the appreciation of his paper and expressed thanks on his behalf.

He did not think that the building of wooden craft has fallen into discard because of the lack of craftsmen. It was more likely a matter of costs. There seemed to have been a tendency for the cost of timber to rise so rapidly that other materials had been sought and therefore cheaper vessels could be built.

There was of course a tendency to look upon a man who could build a dinghy without moulds as an artist and there were quite a number of people who prided themselves on that ability.

Timber boat building in the past was perhaps inherent in certain individuals who had skills in that direction. These skills were not absolutely necessary. It had been his responsibility during the war to set up an organisation for the building of Fairmile patrol vessels. He had been given the opportunity of using 20 skilled shipwrights, among a total shipbuilding force of 300 so-called "shipwrights". The skills of these men had been little more than to know which end of a hammer to use and the purpose of

a saw. These people had to be trained by selecting jobs and setting them to do one specific task. This was in line with the mass-production methods which had been referred to earlier. A scheme of production was developed in which the men were moved rather than material. There were six complete slipways which were identical. A keel was laid once every fortnight. A 112 ft. Fairmile patrol vessel was launched at the end of 3 months and completed 6 weeks later. That delivery was maintained for 20 vessels - one vessel a fortnight. This was done without the use of skilled labour.

The site had been given to the Company that managed it in April 1942 (Concrete Constructions Pty Ltd.). The first shipwrights were employed in August, the first keel was laid in January. In 14 months, 20 vessels had been built. This was done without the use of highly skilled labour.

It was wrong, therefore, to assume that skilled labour had to be depended on.

Timber construction certainly had a place provided the material was available at a price that was competitive.

As a general point he thought all materials had a rightful place in the shipbuilding field. It was important not to say, "We must build in fibre-glass or in ferro-cement", but that materials were selected for the particular purpose in mind. Provided each was built with skill, all materials could find their place.

Captain Alan Pearson referred to Mr Swinfield's notes on the virtues of timber, particularly its long life. One disadvantage, especially with increasing age, was that of watertightness. Were there any recent developments to overcome this problem?

Another major problem was worm infestation. There was protection such as sheathing and anti-fouling rather than prevention.

Mr Boden said that regarding watertightness one of the major problems in timber construction was the tendency of a vessel, over time, to become what was called "nail sick".

With the working of the vessel and the harder quality of the nail, the surrounding timber tended to be destroyed. This had been cured in some types of vessels by re-fastening with a slightly larger nail.

As to other methods of ensuring watertightness, sheathing with GRP had been suggested although there were disadvantages e.g. it was important to ensure that inherent dry rot was not locked into the timber. Timber must be allowed to breathe. Particularly if it was sheathed on both sides there was a potential situation for dry rot to go on and do its work unseen.

Worm infestation could be combated to some extent by pressurising treatments using chemicals which would hinder the growth of the worm. Quite a number of vessels have been built using this method.

Mr Biddle (Sydney Technical College) commented that there was not very much that could be done about worm infestation. There were preservative methods. There were salt-based chemicals which eventually leech out of the timber and then of course, the worm got in. It was a matter of constant surveillance, regularly slipping boats and making sure that they were clear of infestation, giving them a "hair cut and shave" where necessary. The Toredo is the "shipwright's friend" and as far as wooden boat builders were concerned they put him there to destroy boats so that new ones could be built!

Mr Smith (W.A.) said there were many builders of wooden boats in W.A. and they used local timber up to 40 ft. Ply wood was predominantly used. He believed the W.A. timbers were the best boat building timbers in Australia. There were a number of Yugoslav builders, one of whom built wooden-planked vessels by rule of thumb, with no drawings. They built very fine vessels and when they were complete the builders urgently sought someone in Fremantle to draw up the vessel to get the necessary approvals!

Mr K. Campbell referred to maintenance and said that a commercial company of his type could not entertain the thought of wooden vessels, the costs of shipwrights and caulking being too high. For these reasons he could not see any future for tugs and barges in wood; trawlers and pleasure boats perhaps, where owners looked after them carefully and took great interest; but in his case costs were of paramount importance and would rule out wood.

Dr Bowen commented that wooden vessels and steel vessels had been sheathed in ferro-cement to overcome worm attack and leakage. There was a company in Florida U.S.A. which sheathed in this way commercially. The well-known "Joseph Conrad" was sheathed inside in Boston. Both steel and wooden vessels had been sheathed in Auckland and were totally satisfactory in each case.

CONSTRUCTION GENERALLY

Mr Leckie (Dillingham Shipyards) referred to the interesting sideways launching employed by Carringtons. He asked Mr Laverick if he could compare costs and technical problems of these rather dramatic launchings with the more conventional type of launching and was insurance any more costly?

Mr Laverick said sideways launching was adopted initially due to lack of space. Some of the early ones were indeed "hairy". The technique had since been developed a good deal. Inherently it was more dangerous than conventional stern launching. Therefore it was paramount that great care be taken in setting up launching ways and the trigger mechanism particularly. On one occasion last year a launching had got away slightly and had to be postponed for 24 hours.

The advantages were tremendous. All the building berths can be served with overhead cranes, lifting up to 40 ft. module units now and hopefully soon 60 ft. Vessels were on a level keel so that they could be set up with "bubble sticks". It was far easier for outfitting vessels; movement around the vessel was easy and they were accessible by rubber-tyred vehicles and fork lifts which

were used to put in shafts. Cranes could come right up to the berth. Launching ways were not put in in many cases until up to 3 days before launching, if it was a standard vessel; so the vessel was clear underneath except for the building blocks.

The launching itself was much faster and the vessel pulled up much quicker when it hit the water. From the time the champagne bottle broke to the time the vessel hit the water and stopped took about 8 seconds.

Regarding limitations on sideways launchings it was of interest that at Avondale shipyard in U.S.A. ships up to 85,000 t were launched sideways. It had of course been done for many years in Holland due to limitations of narrow canals.

Mr F. Westhorpe referred to the important wooden material now very widely used in wooden construction, namely plywood. It had no joins open to the sea, which overcame the problems of caulking and keeping the vessel tight. It was also possible to keep away from traditional boat-building methods using steam-bent frames and other techniques that Mr Swinfield had referred to. The vessel could be designed to have wooden girders.

It was also possible to get a vessel approved which did not contain any metal fastenings and this overcame the problem of "nail sickness". A completely monolithic hull was therefore possible. By 12 months slipping it was even possible to keep "the shipwright's friend", the borer, at bay.

He concluded by saying that "we wooden shipbuilders have the only divine original guidance" and referred to Genesis 6, Verse 14: "Make thee an ark of gopher wood ....".

Mr Boden endorsed Mr Westhorpe's remarks regarding the virtues of wood construction and referred to the building of Mosquito aircraft during the war and the great stressing which they carried.

Regarding costs there was much more labour involved in building vessels of this type and the cost factor very largely determined what material and method of construction was used.

CONCLUSION

Mr Clarke in closing the session on Construction of Small Ships again thanked the authors and those on the panel for their contributions to the session and the members of the audience for their active participation in the discussion.

He did not wish to cap Mr Westhorpe's biblical quotation but he did refer to Saint Thomas Acquinas who said:-

> "It is the province of reason and intellect ... "to know the proportion between the end and the means to the end, and duly co-ordinate them. Thus in the arts we see that the art of using a ship, i.e. the art of navigation, rules the art of ship-designing; and this in its turn rules the art that is only concerned with preparing the material for the ship".
>
> (St. Thomas I Q.18 a3).

WRITTEN CONTRIBUTION BY MR ARMSTEAD

1. In the discussion on these papers Mr Boden referred to the advantages of the various construction materials. His answer was very similar to that given when replying to a question frequently asked of me in my official capacity "what material do you consider best to use?"

2. These types of enquiries are answered by replying "all the materials commonly used have advantages and disadvantages, you should consider these in relation to your particular proposal or discuss them with your consultant before making a decision on wnich to use."

3. We have also heard of some problems such as osmosis in G.R.P., the need for cathodic protection, dry rot, corrosion and toredo worm. I would suggest that our consultants are in a position to advise clients of the most suitable material, but I do not think many owners and prospective builders are fully aware of the problems or appreciate the solutions.

4. This position can be attributed in part to the large number of small vessels, particularly in the fishing industry, being built, by their future owners who are generally most conservative in outlook.

5. The traditional material for fishing vessels in this State has been timber over a long period. But a cursory examination of the number of plans submitted to the M.S. Board for new fishing vessel construction between 1973 and even date shows a trend in material preference.

Hull	Years 1973	1974	1975
Wood	40	31	8
Steel	21	21	13

The popularity of steel hulls was becoming apparent from about mid 1972. Prior to that our figures indicated a 90% preference for wood.

6. The preference might be attributed to the owner/builder possessing a higher degree of manual skill coupled with the advance of light manufacturing industries away from the capital city. This would be co-incidental with the development or decentralisation programmes of various State Governments. The facilities of structural steel fabrication shops are now readily available and experience is often obtained from unskilled and semi-skilled work therein. Friends are often cajoled or "volunteered" into lending their various skills as welders or fabricators during weekends and holidays. There has been an improvement in transport, resulting in greater mobility and capacity to move larger masses of steel plate and sections.

7. In the past, timber was readily available either by felling and cutting on the builder's part or obtaining the scantlings from the numerous small timber mills now only found in diminishing numbers. The wood was also easily obtained close by in the long

lengths mentioned by Swinfield in his paper. Any person who could use an axe, saw and hammer with some degree of skill would be employed in the construction. Such work was often directed by a sprinkling of skilled Shipwrights who are now similarly assisting with the construction of many steel hulls.

8. As previously mentioned, I have found the majority of fishermen are conservative and traditional in approach very similar indeed to the profession of naval architecture. There are some with a wider view and appreciation of the benefits to be obtained from a more appropriate use of the hull materials now available. Some of the progressive or adventurous have constructed hulls of ferro-cement, others preferring G.R.P. However, the inroads into the field of the traditional materials has not been significant to the present, which I think could be attributed to the conservatively relative costs and an ability on the part of many to undertake construction, repair and maintenance with more confidence in the case of wood or steel. Such ability and confidencesI am sure stems from the individualistic and sometimes ingenious capabilities evident in Australian agriculture referred to by Dr Taplin in his earlier comments.

9. The authors of this group of papers have presented some well documented evidence in support of the various materials and it is regrettable that this symposium did not have sufficient time to more fully discuss these. Perhaps we may look forward to a symposium devoted entirely to the discussion of this subject.

WRITTEN CONTRIBUTION BY MR R. CONNELL (Office of the Purchasing Commission)

Much has been discussed about Small Ships, shipbuilding bounty, role of Small Ships and so on. It seems to me that the symposium was directed more to ships than to small craft, nonetheless several papers referred to small craft and one discussed the building of a 16 metre patrol craft, with which I have had some association. I would prefer to use the term small ship when referring to vessels above 100 ft. or 30.5 m. Small craft below this length and predominantly under 75 ft. To my mind, small ships and small craft are to a degree different subjects which require different technical approaches and certainly different economical structures in financing any building programme. I doubt if in this country we will ever be able to establish a viable shipbuilding industry. Some may disagree, but at least to date, it has not been possible. There has been always the need for Government financial support because users including the Government, have not been prepared to pay the premium for local production, which is regrettable, but nonetheless, true. Contrary to this I believe it is possible to establish a small craft (patrol craft) building industry and perhaps I may be able to make a contribution to this symposium by recounting some of the difficulties encountered in setting in motion the building of the patrol craft in Australia. Firstly, I believe it is possible to achieve profitability in the smaller craft field because:-

1. Higher demand.
2. Lower capital investment.

3. Quicker return on funds invested or a higher velocity of money circulation.

4. Less traditional inhibitions to the use of new techniques and materials.

5. The astronomical increase in the cost of larger vessels which in turn demands greater consideration of small vessels right down to small craft, say 75 ft. or under for roles previously the sole domain of the larger craft.

Apart from pleasure craft, these roles can include fisheries, surveillance of coastline and territorial waters by Customs and Police and possibly Navy and search and rescue operations. The Navy naturally and with thoughts of safety of life at sea, tender not to favour the use of small draft in open sea conditions, particularly those conditions which prevail around the Australian coastline. This however, does not detract from the use of fast patrol craft in a surveillance role of our coastline nor even in an offensive role particularly as these vessels can now be fitted with and launch a variety of missiles capable of putting much larger vessels out of action. Further, it certainly does not detract from the effectiveness of such craft in and around the South East Asian countries. The market for small craft as patrol craft in this area, is untapped. It needs only to be exploited. Admittedly, financial aspects can be a problem in dealing with under developed countries, but they are not insurmountable. A little innovation and the application of "Khemlanian" financial theory with less mystery and greater affect than has been seen recently is required.

With these thoughts in mind, it was I believe a step forward when the Government agreed to provide under our Aid Programme, Australian designed and built fast patrol craft to some of our northern neighbours for anti-smuggling activities. This was the genesis of a patrol craft building industry. The policy decision having been made, the next step was the concern of the then Department of Supply, which initially was to investigate the operational environment in the South East Asian countries concerned. Climate, prevailing sea states, ethnic habits and philosophies, skills and levels of training etc. had to be determined within the limits of the funds available to the Department at that time. The next step was to investigate the most suitable type of craft, the materials of construction, the speed, range and performance considered necessary, and the operational techniques of the smugglers.

Materials of construction had to be specified. The operational environment including weather, and support facilities pointed to aluminium. Skills in maintaining wooden vessels was decreasing rapidly in the case of Malaysia. In addition the country had been exposed to aluminium in small craft to some considerable extent, having received many hundreds of the assault type boats for flood rescue work. Eventually, aluminium marine alloy 5086 and 5083 were selected. A considerable amount of work was carried out in this stage after which a specification was prepared, sufficient, it was considered, for manufacturers in Australia to proceed with a design and manufacturing contract. It then became necessary to

determine sources of supply and even this step proved to be difficult. Without doubt, there were some boat builders who could undertake the building of a one off craft, provided drawings and specifications were available. The sources of supply became limited however, when the design aspect and the number of boats six in all, became known. Financial as well as technical resources needed to be adequate. Contract conditions envisaged did not provide for any subsidy, bounty or pre-payment to any potential builder. Progress payments on a 90% of value of work done basis would be considered. In the long run, the number of sources of supply within the country which had some chance of fulfilling the contract was reduced to about five or six. Nonetheless, public tenders were invited.

Public tenders were invited in January 1970 which resulted in the receipt of five tenders from companies throughout Australia. The evaluation was difficult not so much in assessing the hull shapes, behaviour at sea and performance, but more in the assessment of knowledge and skills in working, forming and joining aluminium. Considerable attention was given to the location of weld effected areas in relation to the high stress points of the hull. Inspection methods had little if any precedence. There was no standard for the welding of aluminium hulls. More important, much thought was needed toward the subsequent care and maintenance of the craft. Noise levels, radio suppression, cathodic protection and habitability were critical and perhaps of more concern had the hull been constructed from G.R.P. or wood. Every tender received was carefully evaluated and each tenderer was visited during which in depth discussions on their respective offers were undertaken. Suysequently, the selection made was I believe, the lowest priced suitable offer, all things considered. Subsequently, an order for six number 45 ft. aluminium patrol craft was placed with De Havilland Marine to be given as a gift from the Australian Government to the Royal Malaysian Police for anti-smuggling activities.

I suggest the small craft building industry and in particular, those firms capable of undertaking the construction of a number of patrol craft, learnt much from tendering and the discussions which ensued for this particular contract. No doubt, some would say it was a costly lesson. As to whether a Government Purchasing Authority should pay for part or all of the costs of tendering for such projects is a subject in itself. Some I know believe a contract for design only should be let in the first instance. This believe me, also has difficulties and very little if any benefit to the customer.

A further requirement for similar craft was the subject of public tenders called in November 1972, which was again won by De Havilland Marine after much deliberation about contractual and technical aspects. Whilst this Company won the Contract on a price basis, though not the lowest, it did have the advantage of a follow through aspect of the previous craft supplied to Malaysia. It in fact, became the Mark II version of the 45 ft. patrol craft and was considerably improved over the Mark I version. Our own Australian Customs began to take an interest in the patrol craft being built under the Aid Programmes and subsequently, orders were placed for similar craft fitted out to a higher standard for use by this organisation.

Public tenders were again called in July 1974, this time for a larger vessel, 16 metres (51 ft.). The policy was still clear that the vessel had to be built in Australia and of course, under an Aid Programme it is desirable to maximise the Australian content of the gift. Nonetheless, the invitation attracted offers for overseas design of vessels to be built in this country. Prices ranged from $2M to $5M, and of course similar difficulties in evaluating tenders to these encountered with previous contracts prevailed but by this time a considerable amount of experience had been built up in respect to these patrol craft. Building techniques had been improved, standards had been adopted for welding and inspection procedures, project management methods had developed and a feeling that this country was in the business of building patrol craft to stay prevailed. We also had a basis of comparison and had received feed back from the Malaysian Police and the Philippines in the performance and operation of their respective fleets. The effectiveness of the local standards of operation and maintenance were known.

This country I believe, has several sources of supply which are quite capable of building fast patrol craft in aluminium and I would think also in G.R.P. although so far this has not been done. The craft so far supplied is the beginning of building up experience in this field. We as a Department, have played no small part in making this step possible and I offer no apologies for making that statement. Aggressive marketing and the pursuit of new technologies, building techniques and materials, are necessary now by the industry if we are to reap the rewards from those early beginnings. I submit also that the various authorities involved in operating marine craft should look more closely at small craft; whilst they may not be capable of providing comfortable conditions on extended sea voyages (although the Attack class vessels are no recommendation in this regard) they are capable of surveillance patrol and offensive roles, the latter particularly in view of the missiles which may be carried and launched effectively on these craft. They have advantages and disadvantages, but they certainly do have a role to play and with a rise in costs of the larger vessels, it is inevitable that their range of activities will be increased. The one word of warning to potential builders considering the possibility of exploiting the South East Asian markets is that they must know intimately, the operational environment in every respect. They must be able to provide or advise in detail the support which must be extended to such craft operating in and around the under developed countries with a view to maximising the operational availability. The craft built for operation in and around Australia do not perhaps, need this detailed back up support, but nonetheless a builder's responsibility should not be considered as finished once he hands over the boat. To adopt this philosophy can result in failure to secure additional contracts.

I apologise for promoting the role of small craft in a Symposium on Small Ships, but after all the programme did include papers on small craft which justifies my action.

I should also wish to make the point that the opinions I have expressed are my own and should not be taken as government policy.

OPERATIONAL EXPERIENCES IN AUSTRALIA

CO-ORDINATOR : MR K.M. MURRAY

Chairman
Institute of Marine Engineers
N.S.W. Division

I have very much pleasure in opening Session 6 of this Symposium - "Operational Experiences in Australia", and to introduce Mr Garth Edwards and Mr Bill Heading, the authors of the two papers before you and at the same time refer to my own comments contained in the Co-ordinator's Introductory Remarks reference pages IX to XI.

In looking around the Auditorium, I can see some of my colleagues who have had considerable experience in this field and would ask them particularly to detail any experience with which they have been directly or indirectly associated so that we may all gain knowledge from their problems.

Firstly we will deal with the papers and then introduce discussion on the other types of craft for which we do not have prepared papers.

ATTACK CLASS PATROL VESSEL - MR EDWARDS

QUESTIONS AND DISCUSSION

Mr James (S.A. Boat Design Services)

With a reduction in running trim, did the vessel become less seaworthy?

No trim records are presented, how did the running trim compare between the model and vessel in service?

Mr I. Clark (G.E.C. Diesels Aust. Ltd.)

I must compliment Mr Edwards on his paper and the problems he has brought to light.

I think, as far as the Attack Class patrol boats are concerned - they have been asked to carry out operations for which they were never designed. The problem of incessant liner wear, low temperatures, slow running, have been brought about by the operations that they have been called to perform. The sea water cooling, I agree, has been a problem for quite some time, and is now in the process of being rectified. On the question of Thermostatic Control, this has been a problem, but has been put down to bad watchkeeping by the Navy in general, not noticing the fact that they were running at very low temperatures. This again has been rectified. The overall problems raised in Mr Edwards' paper regarding main machinery, the majority, if not all, of these problems have now been overcome and I think you'll find thatthe life of the engines or hours between maintenance have been extended.

B.J. Riley (Westham Dredging Co.)

I've found it interesting to note that the gearbox cooler receives the seawater first. I was wondering if there is any special reason for this, whether the gearbox is heavily loaded and requires extra cooling. The automatic air vent which you have on your main engine is of interest - we have had quite a serious problem on one of our vessels for some time, with aeration of the fuel, which has caused us a lot of problems, and it now appears that it isn't the aeration, it's fuel vapour building up in the engine when the engine is going at a reduced speed - the fuel pumps are causing these vapours to build up, and in our case it appears as though the vapour is going right back the opposite way through the fuel pump into the engine daily service tank and the air from these vapours is then entering into other machinery, which is causing these machines to stop. I was wondering if this automatic air vent might work in the same way for fuel vapour as it would for air in the system.

Mr E.T. Bell ((Naval Dockyard, Garden Island)

I'm afraid I cannot let the opportunity pass without having something to say about the Attack class patrol boats. I was in charge of this project at Navy Office. I'm not going into details and have no apologies tomake for these vessels. We had armament area to provide forward and ammunition requirements to meet, anchor arrangements and many other matters. We had to provide space for accommodation which was relatively tight.

Commenting on the wedge which seems to have everyone bothered. This wedge idea emanated from me, as far as Australia is concerned. When I was in Great Britain in '54-'57, I was very much involved with the control of the 50 knot fast patrol boats. I was told that they had to fit a flap to these vessels to prevent porpoising. During these discussions I was informed that they could pick up a knot with the adoption of a flap. So I thought that here was an opportunity to put a wedge on our boat because we were battling for power - the weight was increasing, size increasing, and thus th the decision was made that we would put a wedge on the transom of the boat. We managed to pick up some information from the U.S. Coastguard which verified what we were trying to achieve. I thought it would be a great thing for young University undergraduates to find out a little more about the wedge. The first wedge put on the Attack Class was originally 3" deep but we later cropped off half because of steering difficulties.

The boat was designed by the Department of Navy from the Naval staff down. In the Naval staff area there is a marked tendency to go overseas to buy something. However, we won the day and the patrol boats were designed and built in Australia. I agree there were some faults, but had they been handled the right way and had we more flexibility these faults could have been overcome.

The shipbuilders were not used to the small type craft and this created problems. Commonwealth Engineering had never built a ship before and therefore required considerable guidance from us. However, they rapidly acquired experience and were able to build

to a standard comparable to any established shipyard.

Mr E.S. Clarke (Shipbuilding Division, Dept. of Transport, N.S.W.)

In view of Mr Bell's interesting comments, it raised the question when a costly and important vessel especially for Defence is built, whether a prototype should be developed and constructed before the whole line of fourteen or more are built.

Answer to Mr Clarke - Mr Bell

When this programme commenced, the patrol boats were to replace the Ton class mine sweepers which were operating off Indonesia during the confrontation back in the early sixties. That is the reason why we had to do something about patrol boats for that area, because the confrontation seemed to be getting worse.

We, at the time, were considering building one boat as a prototype, but the influence of the Indonesian situation compelled us to go straight ahead with the project. It was originally 11 boats, then extended to 20.

Reply to Mr James (S.A. Boat Design Services)

I cannot answer whether the trim changed or not, I'm sorry, Also I have no detailed knowledge of the model tests.

Reply to Mr Bell

Let me clear up one point very quickly as far as I was concerned, the patrol boats were very good!

We had our minor problems but I think that if you observe from what is in the paper, you will note that they were very minor - and the fact that the "Rockys" can sail one around for eight years without any major catastrophe is not a bad recommendation.

The main engines had special air-bleeds - I think they were part of G.E.C.'s supply and could handle quantities of air coming to the main engine and by-pass it back to the tanks, the main engines could therefore operate with the vessel listed.

One of the main problems was the generators in which the lubricating oil pump suctions would be momentarily uncovered by a heavy rolling action of the oil from one side to the other, thus losing suction and causing the engine to trip. But again, it could be controlled.

Regarding sea suctions - I can recall a vessel named the "Taroona", which used to operate across Bass Strait. As a Junior, I spent watch after watch running from Port to Starboard, opening and closing air bleeds to keep the air out of the suctions because of the vessel's roll.

Low Speed Running is, in my opinion, a universal problem with turbo charged engines. There is a scavenging problem, because we are not delivering quite enough air. In my opinion, it is the

low speeds which cause problems.

We had problems with the thermostat on the Paxmans, but after a little study of the cooling system were able to overcome this problem.

There were no real problems with the clutches. The Bloctube design was extremely touchy, and, of course, there were some minor adjustments in the early stages when limit switches weren't fitted to the clutches which were interlocked with the main engine starting circuits, and you could get a 'hairy' start on the engines in which the ship would go ahead or astern, as the case may be! We found out what the problem was, however, and cleared it up.

There were a few problems with the steering, one being a lack of feed forward. The wheel on the bridge or in the wheelhouse had a handle on the spokes and as a result it was being turned too quickly, and you would get a momentary lapse of hydraulic boost. If the wheel was turned at a reasonable speed, the vessel would steer adequately.

Reply to Mr Clarke

Mr Clark of G.E.C. mentions again the slow running problems. On the Paxmans we have had very little trouble. We had minor troubles on things like the centrifugal switches, but once we understood the working and kept them maintained, no problems were experienced.

Reply to Mr Riley

Mr Riley, I can't comment about gearbox cooling, but the air vents, as I mentioned previously, function very well, I have no knowledge of your system; however, two things occur to me that may be your problem, it could be temperature and cavitation or the boost pump. Another thing is that you may have oil feeding through too small a pipe, with the corresponding problems of friction possibly causing vapour locking.

On the question of flare - I realise that the flare of the bow was necessary but it gave a fairly violent ride at the for'd end once buoyancy took over. The main problems appeared to us to develop when the waves were relatively steep, without warning one minute you might have about 3 or 4 foot of water dumped on the forecastle and alternatively, after entering the wave, you would get a violent elevated effect, so much so that people sleeping in the for'd accommodation had to strap themselves into their bunks.

Perhaps my interpretation of the wedge was slightly incorrect, but from my memory, we took Archer over in November '68 and the wedges were fitted some time early '69, so, therefore in my paper I assumed it was a modification. I have now, of course, been corrected. Thank you, gentlemen.

PASSENGER FERRIES IN SYDNEY HARBOUR - MR HEADING

QUESTIONS AND DISCUSSION:

Mr R. Hallett (Department of Transport, N.S.W.)

Two questions concerning maintenance and practices involved. On the "Lady Edalene" and the "Karriba" on which I periodically travel, I have noticed that the "Edalene" only has a propeller on one end, so that when she's docking there is not the opportunity to put the for'd propeller astern and so brake the ship, and I was wondering if there is any difference or if that is a severe disadvantage over having the propeller at the other end and if it isn't, then maybe maintenance might be improved by not engaging the forward clutch. Alternatively, I wonder if you might have any comments on the use of some sort of passive braking device, instead of continually engaging the forward clutch, and therefore maybe reducing maintenance. Is it possible to use roller fenders on pontoon type wharfs, rather than the present business of sustaining as you mentioned in your paper, damage to the belting.

Captain N.W. Abbott (Adelaide Steamship Co. Ltd., S.A.)

Your comments on the operational hazards and, in particular, your mention of the sponson band fitted to the ferry. We used to have wooden sponsons with a belting bar on the outside, butt welded and secured with dumps. It was a constant source of annoyance - as the tug only had to land hard against the berth two or three times especially if of heavy displacement and you end up with the dumps pulled out, also the welding would crack at the butt and cause the sponson band to peel off. We overcame this damage by making the sponson solid and this was done with a half round cope bar fitted into an inch and half thick flat bar, welded right around the top of the sheer strake. We had one tug built in 1926 and we disposed of her in 1960 and she never had one repair to the sponson.

Mr Armstead (Maritime Services Board of N.S.W.)

I appreciate the difficulties that the Public Transport Commission have in operating, in particular the Hydrofoils on the harbour, with the debris. The board are constantly picking up debris from the harbour. Because of the cost involved, a "Floating garbage can", which had been suggested, was never constructed. It can be very frightening and dangerous for the Hydrofoils if they get heavy debris across the foils.

Mr Denis Crosby (Smith and Crosby, Brisbane)

I would like to congratulate Mr Heading on his paper and also ask a few questions. Does adverse sea conditions induce any deformation over any period of time of the hull, and have you noticed any significant hull corrosion problems since you have had the vessels in service for this amount of time?

Reply to Mr R. Hallett

The question of the forward and after propellers and the necessity to stop the vessel with the for'd propeller - you mentioned the "Lady Edalene" - the problem with that vessel is that you can't make the propeller work equally well ahead as astern. This is essential because we can't turn the boat around. When it gets to the other terminal, the master changes ends. In one track the vessel is being pushed and on the other track, the vessel is being pulled. I don't know of any propeller that can do this effectively. The obvious thing to do was then to go to the next class of vessel which has a forward propeller and an aft propeller, either of which is engaged. If you want to go ahead, you engage your aft propeller, if you want to stop, the for'd propeller is engaged. There is, however, a rather violent shuddering of the machinery and shafting, but it must be remembered that the shafting on these vessels is continuous through the ship. It's a bit violent, but there is no other way of doing it. Unfortunately, the people I work for - the Public Transport Commission - cannot afford the money to go to the ideal drive, which is diesel electric, and I make no apologies. We have the existing Manly Ferries which were converted in the 1950's to diesel electric propulsion and there is absolutely no doubt that they are the best means of propulsion for a harbour ferry.

Roller fenders - we would welcome any endeavour by any authority to assist in giving us proper wharfage. All our wharfage is supplied by the Maritime Services Board - over which we have no control, all we do is damage it! The wharves we service at the moment were designed for wooden vessels which 'gave'. We now have steel vessels which don't! Consequently, we knock the wharves down with monotonous regularity. We now have pontoons in quite a number of places, which are much better, but they still create problems. There are quite a number of things around, such as roller fenders, which I feel sure would help to overcome these problems, but it requires a little bit of a combined effort. The Shipbuilder and the Ship Designer can design all sorts of fancy equipment on the ship side to take the shock of berthing, but unfortunately, we must have somewhere to berth it against and that, at the moment, is probably our biggest problem.

Reply to Captain Abbott

I appreciate your comments, Captain, but we must have something that will give some resilience, something that will give just a little bit, because unfortunately the wharves can't take any sort of knock at all. We have a vessel, the "Lady Northcote" (which is 140 ft. long), serving the Mosman area--it demolished a wharf in six months, which had to be completely rebuilt! Unfortunately, this is a problem with which we are faced. A solid steel wharf is of course, going to solve the problem but the ancillary damage that we do is just too much to contemplate.

Reply to Mr Armstead

I must compliment the Maritime Services Board on this collection of debris. In recent times, we have had very few accidents and failures because of debris, but in the early days,

the incidents of failure because of debris were many. This aspect is of particular concern to us as the hydrofoils are very sensitive to any increase in drag particularly by collection of debris on the foils.

Reply to Mr D. Crosby

On the question of deformation of the vessel, the hydrofoils have been in operation now for 12 years, in particular, the Manly, which is a PT20. In that time, it has undergone one major refit, during which we replaced the rudder structure, but at no time have we noticed any deformation in the hull or for that matter on any of the other vessels - they are surprisingly robust. I don't know what the secret is, but the aluminium plating used is rivetted, not welded, also we do not get any cracking problems, the plates on the Hydrofoils have never been replaced, except on the Manly and that was because it ran into another vessel.

As far as corrosion is concerned, it is a big problem. With the foils in particular, we have on them sacrificial anodes, also we tie it to a static installation each evening, which is a plug-in system, and this appears to stop our corrosion. I do know that in Hong Kong the corrosion problems are absolutely ferocious. They replate the bottom of their boats every five years. One particular operator has gone to the expense of replating a PT20, which is the smallest one, completely in stainless steel, to try to overcome the corrosion problem. What the secret is is a little difficult to determine. We just apply conventional shipbuilding practice in the placing of the sacrificial anodes, but I did find out that where the hydrofoils tie up in Hong Kong is over the top of an 8 ft. diameter sewer outlet from the island. Now, I think that this may be the cause of the problem!

Chairman

I would like to call on Captain Abbott to give, briefly, some of the problems with which he is associated in the tug industry.

Captain Abbott (Group/Towage Supt., Adelaide Steamships)

Thank you Mr Chairman. The major operating problems that we have in our industry are very similar to others.

On the mechanical side, with our particular fleet in South Australia, we still have an oil fired steamer, which was built in 1948 and she is absolutely no problem whatsoever. You don't need ear muffs, all you need is a copious supply of fuel oil, which is very expensive and burns about 25 tons a month more than the diesel and carries an extra man, making operating costs very high. Also, because the boiler is a pressure vessel under the Department of Harbours and Marine Regulations - we have to blow her down every 12 months - knock in the doors and carry out an internal inspection. The boiler, fortunately is in very good condition after 27 years.

On the diesel vessels, we have many and varied machinery types - we have double input and single output with fluid couplings between main engines and gearboxes, three-speed gearboxes, fluid

couplings and single reverse reduction gearboxes, straight out reduction gearboxes and controllable pitch propellers and I find that if things are inspected at proper and regular intervals with a shore maintenance staff who is conversant with the machinery (and the operative word is conversant), the troubles, generally, are minor.

As you will probably appreciate, the engineers carried in all of the main ship handling tugs throughout Australia have at least the minimum qualification, a Second Class Ministry of Transport Certificate, and the majority have First Class Certificates, both Steam and Diesel. Also most of the engineers have been with tugs for a long time.

Maintenance to fit in with operational duties is a very difficult thing to do at times and we have found in the North West Ports, Fremantle and South Australia, that the continuous survey of the machinery cycle has proved to be the most efficient. Things only have to be looked at every 5 years. In most instances it's a crying shame to open them up, but in large percentage of times, there are things noticed there that, if equipment hadn't been opened at the requisite period of time, may have led to a very expensive breakdown. We usually find that over a period of years with the same fitters and foremen working within the engine rooms that we can set heads, liners, pistons, top and bottom ends, main bearings, down to a time factor and dependent on the fact that you get those same figures, you can generally plan to pull a tug out that is operating on a 5 year cycle for 3 days perhaps, every 4-5 months, and everything will be looked at in a complete cycle of the 5 year survey.

In order to reduce costs, which is everybody's problem, we have gone to 2 year dockings and this, of course, has brought about many representations to paint manufacturers in order to get the anti-fouling to stand up to the requirements, this is most particular in a place like Port Hedland where the nearest dock is about 100 miles away! You will appreciate that sacrificial anodes must have a 2 to 2½ year life and the anti-fouling must be the best that we can get, conducive to the conditions in any particular area. The main problem, coming back, apart from industrial, of course, is costs. I have been Superintendent now for 17 years and I would say, reasonably qualified to notice over that period of time, the general fall-off in productivity.

We have the same problems that Mr Heading has with plastic bags causing blockage of suctions. Tyres are another bad thing - they do have a facility of fouling Kort nozzles, and we've ended up with a tyre shrouding the four blades of a propeller which required a slipping. This happened about 15 years ago, and it fortunately hasn't happened since!

I don't think there's anything further that I can add. Towage operations is quite an involved science. And this leads me to make a very pertinent point, that over the years, as you no doubt read in Mr Dummett's paper, tugs in say, N.S.W., had a bollard pull of about 12 tons, with 1200 indicated horsepower, 145 foot in length with a displacement of about 960 tons and three of these tugs were able to handle the Himalaya and similar vessels without any difficulties.

We have container ships today that are very similar in size to those passenger ships and the operators that use the tugs, but don't pay for them, insist on tugs these days having bollard pulls of 25/30 and even up to 40 tons. Our Company, in particular, is building a tug with a bollard pull of 51 tons. This requires a high capital investment which ultimately has to be paid for.

The tug industry is thus becoming a very heavy cost industry. The other unfortunate aspect is the fact that ships are getting bigger and they're getting less in numbers. We do have a problem as regards the particular power that is required to service the needs of the shipping industry. Whereas, in years gone by, there were many tugs because there were a vaster number of ships. We still have a similar number of tugs, but half the number of ships. I'll leave you with that thought, gentlemen, especially the naval architects!

Chairman

Thank you, Captain Abbott, for your contribution. I would now like to call on Mr Fitzgerald to add to the discussion.

Mr Fitzgerald - Operational Experiences in the Fishing Industry

I feel a little inadequate following Captain Abbott, I'm afraid. Perhaps I'm not the best person to comment on the operation of fishing vessels. Unlike tugs, fishing vessels are generally individually owned and each skipper generally has some share in the ownership of his vessel.

Probably the greatest difficulty in operating a fishing vessel is paying for it! The next one is probably getting the type of vessel that you want, and probably the reason that the second problem is rather difficult is that I don't think anybody really does know what sort of fishing boat they really want. They know they want a stern or a purse seiner trawler or what have you, but they don't know exactly the handling characteristics that they want, nor do they know the handling characteristics which are desirable for the particular field of fishing that they want to enter into. So it becomes very difficult to tell a designer exactly what you want.

I think something that would relieve this situation considerably would be a standardisation of vessel types and particularly equipment. In Australia, unlike overseas countries you cannot go along and buy almost any single component of fishing equipment. You go along to the various suppliers here, buy a bundle of net and make up a net according to your own design. Overseas these are available in a large variety of sizes. So that it is rather difficult to maintain equipment in a reasonably good standard, because the supply of the various components that go towards it are not readily available.

The idea of a fishing boat, of course, is to make money. There is quite a lot of difficulty in doing just that, with deflated fish prices, etc. Generally the marketing of fish is not good in Australia. So, economically, it is not a particularly good

industry in which to work, stemming from the fact that it requires very big money only available from big companies. Happily that might change in the near future - there are some big companies who are interested in some of the work that we've done and therefore there is a potential.

Another difficulty in operating is the lack of navigational aids. Most of the tuna boats are working quite long distances off the coast - up to about 100 miles, and they are fitting themselves with radio direction finders which tell them just where they are - but there are only about 12 or 13 DF stations around 12,000 miles of coastline particularly designed for marine work. It is possible to use an RDF on ordinary broadcast stations, but these are generally inland. A navigational aid would certainly be of great assistance, something in the line of the Decca system they have overseas. This would not only give positional pictures for those boats offshore, but it would also increase the catch efficiency of the boat inshore when working close to reefs. They would be able to get very much closer to reefs and the fish which occupy the reef areas. I recommend that serious consideration be given to the setting up of a navigation system, such as the Decca, around the Australian coast.

Crewing is sometimes a bit of a problem. The crews are generally engaged on a share basis, so the best boats get the best crew.

On the side of navigation I would mention also the hydrographic charts at the present time, due to the economy measures, are getting less and less information on the bottom formation and nature. In the main our fisheries in Australia are bottom fishing so that the fisherman are very interested in the type of bottom around. You can't get much information from the charts any longer, except depth.

Chairman

Thank you Mr Fitzgerald for your most useful contribution.

In summing up this session it gets back to one major item and that is communication. In other words we must have communication between the operators and the designers also the manufacturers of equipment and builders of the vessels. I will just leave you with those words - please communicate with your people so that those who are producing the item and also the designers who are going to assist know exactly what you want in the operation of your vessel. This feed back is most essential.

WRITTEN DISCUSSION

Mr C.J. Oliver (Auckland Harbour Board, New Zealand)

With reference to Mr Heading's comments on operational problems encountered with a harbour fleet, our experience with cooling problems at Auckland may be summarised as follows with a run down of our fleets:-

Floating Crane

Diesel-electric Voith-Schneider propelled-conventional cooling system has given no problems.

Cutter Suction Dredge

The use of large chambers as sea chests enables silt and sand to settle and hasresulted in little cooling trouble.

Bucket Dredge

Here the hull was used as a heat exchanger with a double skin fitted to the box shaped hull through which the engine cooling water passed and this has been most successful.

Dredging Service Tow Boats

The earlier single screw vessels were converted to keel cooling to prevent cooler fouling but with the larger twin screw vessel there is so much horse power in a small hull that in order to get the necessary cooling area, we reverted to a conventional system with extra S.W. filters of fine mesh stainless gauze.

Apart from this there have been numerous problems due to air locking of S.W. cooling systems in shallow draught vessels as the cooling system is only just below the sea level and I feel that ship builders and consultants need to pay close attention to the design of sea chests and piping systems to overcome these problems.

Tugs

Plastic bags over sea suctions were a problem in the older steam tugs, necessitating the use of divers to clear. However, on investigation the sea chests were found to have an adequate area but the design of the holes in the skin fitted strainer plate was such that a partial blockage promptly caused overheating and this was remedied with a redesign of the plates giving much larger holes to increase area. With the building of the first diesel engined Voith-Schneider tugs care was taken that both sea chest and strainer plate were more than adequate to cope with plastic bags.

Tug Operational Accidents

The oldest vessel in the fleet, a coal fired twin screw tug, collided bow on with a vessel she was assisting to berth due to a failure of the electric telegraphs, the master being unable to leave the wheel to use the voice pipe, so as a back up a telephone system has been fitted between the wheel and engine control station. The tug suffered moderate bow damage and both scotch boilers moved forward, but due to vessels age these were left in that position and seatings rebuilt around them.

The next oldest is an oil fired twin screw fixed kort nozzle tug which has suffered occasional propeller damage due to small logs passing through the kort nozzles. Another problem has been with the oil filled stern tubes with wire ropes winding around the shaft tearing off the rope guard and damaging the stern tube oil seals necessitating dry docking. Furthermore it has been found prudent not to sandblast the hull at the surveys at which tail shafts are drawn if one wishes to avoid leaky stern tube seals.

The two V.S. tugs have suffered no damage in normal ship-handling operations even when a vessels line has wound around the blades. Normally these tugs use their own lines not those of the vessel they are handling. Two unusual accidents happened to the earlier V.S. tug, once when she strayed into a boat harbour and picked up a nylon mooring line followed by the chain and heavy weights of the mooring causing considerable damage. On the other occasion, she was assisting the dredging service and cut too finely around the stern of the dredge fouling and cutting the stern mooring wire and winding it around the blades again causing a fair amount of blade damage.

Apart from the tugs the dredging service towboats being open screw craft used to suffer considerable propeller damage in their shallow water work on stone banks and moorings. The fitting of a heavy steel ring about 9" wide around the blades rather like a mini Kort nozzle, has in the main overcome this problem.

Mr E.S. Clarke (Department of Transport, Shipbuilding Division)

It is noted from Mr Heading's paper (page VI-14) also the discussion, that a major operational cost both to the P.T.C. and the M.S.B. results from contact by the conventional ferries whilst berthing.

I would therefore ask whether this would indicate that the gentler and more controlled berthing and unberthing which could be expected from twin Voith Schneider propellers would more than justify the additional cost.

There is no doubt considerable experience with this form of proposition on the Brisbane River by the service provided by the ferry "Sir James Holt" although admittedly it is on a very different type of service, but probably the berthing and unberthing is comparable if not greater when considered over a twelve month period also the operation is carried out from a direction roughly at right angles to the wharf face.

Mr T.B. Gorman (N.S.W. Fisheries Dept.)

Would Mr Heading please comment on the utilisation of fixed side wall surface affect vessels which appear to offer operational advantages over hydrofoils for fast ferry routes on the harbour. I specially refer to (a) lower-power requirement, (b) reduced sensitivity to debris, (c) easier berthing at simple berthage facilities.

Captain B. Lewarn (Sydney Technical College)

I would like to make the following general comments.

Where does the designers and builders responsibility stop? It appears in many cases as if they have just awoken from a nightmare and then set out to extract vengence on the crew members, as an example we find poor alignment of loads to the winches, bridge equipment scattered about rather than placed, hydrants strategically placed to trip the unwary, valves in awkward positions. Although these are minor points with a little consultation and forethought they could make the operation of a vessel considerably simpler and more efficient.

My question is therefore just who is or indeed who should be responsible for the ergonomic positioning of equipment?

I maintain that experienced seafarers rather than just Superintendents should be consulted as they possess a vast store of information which I am certain they would be only too pleased to have utilised. After all, it is in everyone's best interests to have equipment placed where it can be best utilised.

In Reply to Mr E.S. Clarke

Up to the present, Voith-Schneider Propellers for propulsion of harbour ferries in Sydney have not to my knowledge been considered but no doubt when considering future ferry requirements for the P.T.C. the merits and demerits of this form of propulsion will be examined.

In Reply to Mr T.B. Gorman

Your question is best answered by referring to each point in order:-

(1) It is a fact that the power requirements are lower for the hovercraft. However, the actual difference is not great. The HP/passenger is 15 for the hovercraft and 18.24 for the hydrofoil. The figures are based on the HM2 hovercraft and a PT20 hydrofoil, as these vessels have approximately the same payload. It must be pointed out that the saving in power is offset by necessity for 3 main engines as opposed to 1 engine in the hydrofoil.

(2) The question of sensitivity to debris is difficult to answer. It is my opinion that the hydrofoil has a greater resistance to debris because of the following:-

(a) At full speed the immersed depth of the propeller is greater.

(b) The comparable hydrofoil has only 1 propeller.

(c) The propeller is protected to an extent by the forward and aft foil which tends to push the debris aside.

(d) A particularly large object will only damage the foil if struck at full speed, whereas the hovercraft would undoubtedly be holed.

(e) The flexible skirt of the hovercraft is very susceptible to damage due to its method of construction.

(f) The twin hulls of the hovercraft would, I believe, tend to "funnel" debris into the propellers and thus increase the danger.

(3/4) I would agree that in terms of berthing and berthing facilities the hovercraft is superior.

All the above is, of course, extremely relevant in vessel selection, however, there are two other factors not mentioned: (1) Seakeeping, (2) Size.

Seakeeping - This is the biggest disappointment with the fixed side wall vessels. Any swell or even a wash from another vessel causes the hovercraft to lose its air cushion, resulting in stopping and restarting. For this reason the hovercraft would be restricted to inner harbour services. At this point, the second barrier arises in the shape of passenger capacity. The services are required to move a large number of people in the peak periods, however, in between these times a small number only are carried. Undoubtedly the hovercraft could transport this small load, but the peak period would require the larger vessels.

Chairman - Mr K.M. Murray

As the comments made by Captain B. Lewarn are of a general nature, I feel that I should reply. In my summing up of the discussion at the end of the Session, I referred to communication, and I am sure that none of the complaints made by Captain Lewarn would have eventuated if this simple exercise had been carried out.

It is my opinion that the customer is the person who has the sole responsibility to make sure that he receives a vessel which will satisfy his requirements. Unfortunately, not all persons are able to communicate clearly their requirements and the designer and subsequently the shipbuilder produce firstly a plan which in many cases is approved by the shipowner and the work put in hand then no sooner is the job completed than complaints are made to the shipbuilder that the job is not what was wanted which subsequently results in alterations being necessary, together with added costs. There are two ways which this problem can be overcome. If the organisation purchasing the ship is large enough then they can employ their own design staff and having been associated in this field myself for a considerable number of years, I did exactly what Captain Lewarn suggests. If I wanted to know the best way to say layout the instrumentation and other equipment on the Bridge of a vessel, those responsible for navigating the vessel were consulted and their opinions canvassed. You would often find a considerable difference of opinion between those consulted and if this was the case then it was up to designer to get those with differing ideas

together and to come either to a compromise or to get unanimity on one method. I can recall on one occasion when laying out the radio room on a vessel of ignoring the suggested arrangement produced by the suppliers of the equipment and arriving at a completely new arrangement based on the requirements of the Radio Officer who would subsequently be operating the equipment. I also went so far as to design a chair based on the Radio Officer's requirements and as a result the layout was in every way practical and efficient and without any complaints from those persons who subsequently were called upon to use the equipment. As a matter of interest the Radio Officer concerned on this occasion could not read a drawing and therefore I had to roughly similate the required layout in order to ascertain if that was his requirements. Unfortunately, I admit that some designers are not always prepared to go to these lengths but I personally feel that it is essential.

The alternatives to the shipowner having his own staff of designers is to employ a consultant who could and should approach the design in a similar way to which I have described earlier or another method is to have a look at a similar craft to the one required and then tell the shipbuilder of your specific requirements if alterations should be necessary.

In conclusion, I can only revert to my original plea, "communicate."

RESEARCH IN THE SMALL SHIP FIELD

CO-ORDINATOR : PROFESSOR P.T. FINK
University of New South Wales
Sydney

CO-ORDINATOR'S INTRODUCTION - See p.xi, Volume 2

DISCUSSION OF PAPER NO. 1

Mr E.S. Clarke (Dept. of Transport) asked what the future held for the A.C.V. in terms of economic carriage of passengers and freight.

Mr R.J. Herd (Dept. of Transport) referred to the recent use of an A.C.V. in a survey to check possible use of such vehicles as ambulances in the Torres Strait area. There had been a good reaction from local users and operating experience had also been satisfactory. He felt that the paper provided useful background information for those who had to certify such vehicles in this country.

Mr N.D. Chidgey felt that experience with a passenger-carrying A.C.V. ferry indicated that economy might be satisfactory so long as a high load factor was maintained. He also noted that the A.C.V. created significantly less disturbance on foreshores than did the hydrofoil slip.

Written Contributions were received from:-

Mr R. Cornell (Office of the Purchasing Commission) - I recently was involved in the examination of offers in conjunction with the Australian Department of Transport. For removal of the wreck "Koondooloo" from Trial Bay beach (Near Kempsey).

One offer proposed to build and use an air-cushion vehicle for transfer of the cut up vessel (about ½ tonne bits) along the beach across a shallow creek about 50 ft. wide to a site where the pieces were to be loaded by crane onto trucks.

The cost of the A.C.V. was stated to be about $3,000.

Does Dr. Doctors see a use for A.C.V. in this type of handling operation. Further, what is his opinion of the cost estimate.

Mr D. Eyres (Ministry of Transport, N.Z.) - A question concerning regulatory bodies responsible for hovercraft safety like my own department at the present time is the question of hovercraft stability. The main problem in this respect is what I believe is called 'skirt tuck under'. Would Dr. Doctors explain this phenomena and comment on this problem.

The recent capsize of a B.H.C. cross channel ferry has been attributed to this and the British regulations authority has appointed a committee of experts to examine the problem.

Mr P.A. James (S.A. Boat Design Services, S.A.). No mention has been made of the performance of hovercraft on land. Australia would lend itself to this mode of transport very well, especially in the outback.

Mr R.W. Wilkinson (B.P. (Australia) Limited). Following Mr Chidgey's remarks on economics of the A.C.V. used in Sydney Harbour, may I say the vehicle is said to have been economically successful without having achieved 100% passenger support. However, the sponsors wanted a potential operator to be interested in a service involving more than one vehicle. No service employing one vehicle is viable due to the lack of flexibility in regard to damage, repair and overhaul. The fixed wall, marine drive A.C.V. would appear to be an ideal vehicle in Sydney harbour for fast short haul services to complement the apparent success of the hydrofoi s in fast long haul services.

Reply - Dr L.J. Doctors

Mr E.S. Clarke: At present the application appeared to be more in the military than in the civil field. However, more civil development is under way. Skirt replacement and engine maintenance due to salt corrosion were particularly expensive contributors to maintenance costs. The surface-effect-ship S.E.S. equipped with sidewalls was more efficient in respect of lifting power and the U.S. Navy has sponsored the development of two 100t "models" capable of speeds of 80 kt in calm water and 60 kt in moderate seas. Studies are proceeding to improve the riding qualities of such vehicles as they are not yet satisfactory at speed.

Mr N.D. Chidgey: The writer agrees with these comments on the load factor, which is a function of the cost of the ticket as well as frequency of the service, convenience, reliability, etc.

Mr R. Cornell: The concept of using an A.C.V. for this purpose seems quite reasonable. This assumes that the craft would have adequate clearance to operate over any irregularities that might exist, such as rocks and river banks.

On the other hand, one would imagine it to be rather unusual to build a special vehicle for this one task, since there are other already available means of transport. For example, the cost of hiring a helicopter for the short time required might prove to be cheaper than the figure of $3,000 appears to be an underestimation of the construction of the latter.

Mr D. Eyres: The problem of 'skirt tuck under', also referred to as 'plough-in', was mainly associated with an earlier type of skirt consisting of a double-walled arrangement containing an annular jet of air. Due to hydrodynamic pressure and frictional forces, the smooth exterior of this skirt near the bow could occasionally become attached to the water surface (during calm conditions), and progressively and rapidly be drawn on to the water until the craft overturned.

Current skirts use a bag and a series of so-called fingers suspended below it. These fingers present a rough surface to the water surface so that plough-in is almost non-existent now. The

particular incident referred to here, it is believed, was of a B.H.C. S.R.N-4 hovercraft encountering very heavy seas which damaged part of the bow. However, the craft safely returned to base under its own power.

Mr P.A. James: It is believed that hovercraft have not been used to a greater extent over land because of the problems of excessive skirtwear and dust ingestion by the engines.

Of course, the main advantage of the A.C.V. is lost, if a suitable road exists, since then we can use conventional wheeled vehicles instead.

Mr R.W. Wilkinson: The present writer agrees entirely with Mr Wilkinson. Clearly, one needs a number of craft in operation on a service to allow for the situation when one is under repair or being maintained.

It is not obvious without careful examination of all the parameters to decide whether a particular length of trip is more suited to a sidewall A.C.V. or to a hydrofoil.

DISCUSSION OF PAPER NO. 2

Mr C.E. Boden (Boden Associates, Sydney) stated that he had used the towing tank at University of Sydney on many occasions to estimate power requirements of small vessels and also to check unusual situations such as may occur when a vessel is on tow. He had also found it very useful for demonstrating such characteristics as trim and spraymaking.

Mr K.S. Brown (Department of Defence (Navy)), mentioned that he had chaired a committee to enquire into the question of whether it was desirable to have a national towing tank in Australia. This had produced a report two years earlier. At that time, it appeared that a 'minimum' facility, but an order of magnitude greater than Mr Halliday's, would have cost $2.5 million with running cost of $250,000 p.a. A larger facility may have cost four times as much. Many smaller countries had shipmodel test facilities. He reflected on our national lack of confidence in this area. He also pointed out the strength of the research/development/design/construction/operation/maintenance chain was no greater than that of its weakest link.

Mr L.B. Glover (L.B. Glover & Associates) referred to a series of aft-end vibration problems and to steering difficulties experienced by some Australian-designed ships in recent years. He doubted whether the small tank was an adequate tool to help solve this type of problem.

Mr S.S. Schaetzel (Hawker de Havilland Research), noted that whereas expenditure on merchant shipbuilding in 1974 had been $68 million, there was virtually zero expenditure on research. At the same time an expenditure of $40 million on aerospace projects was supported by $8-12 million for research. In these circumstances, local research facilities could not support good class local design.

Mr E.W. Armstrong (Maritime Services Board of N.S.W.), said that Mr Halliday has provided a quite frank paper where he openly concedes the limitations of the small ship model tank. At the same time he has a strong argument in support of its valuable role as a teaching tool. This paper should also assist in clearing some of the misunderstanding and ignorance in Australia on the exact role of tank testing in relation to design and investigation.

From the comments of several speakers to this paper, I have gained the impression that tank testing is blindly accepted as the final factor, the results and recommendations being implicitly followed. I do not agree. The naval architect or designer should use the ship tank as another of the very refined and effective tools to assist or advise him on possible solutions. Only after some experience with its capabilities and the results of actual application can this be really appreciated. We have a similar situation with computers - too many people rely on the computer's mythical infallability without thinking of the human factor in its control or being able to recognise if the output is in the order of values expected as a result of previous experience.

I do not think we could ever afford to establish or support a ship model tank in this country. While it may be commendable from a nationalistic viewpoint, the volume of work would not, in my opinion, be sufficient to maintain continuity. Whether the expense involved would be offset against a facility's possible value to our defence forces is another question.

Mr P.A. James (Maritime Concultant), said that the small ship tank can be run successfully on a commercial basis as demonstrated by the Saunders-Roe facilities which have been running since the war, and are continually expanding.

The major cost item in model testing is in the scaled model itself and this can amount to 50% of the total cost of the investigation.

Unless the design is of unorthodox form, the designer should have not to go to the tank. Not one of my designs have been tank tested, yet all have come up to expectations. My experience in the Model/Ship tank has greatly assisted me in this.

Mr R.W. Wilkinson (B.P. (Australia) Limited), commented that following discussion by Mr K.S. Brown and others on the desirability of the establishment of a National Hydrodynamics Laboratory, and that this might be some years hence due to costs etc., may I suggest that while a port may never reach a stage where no further development is contemplated, one would think that a stage would be reached in a few years when the Hydraulic Model of Botany Bay is no longer required as such.

This very large building situated on the shore at Botany Bay and operated by the Ports Authority of N.S.W., which contains a wave making machine and laboratory, might then become available for establishment of a National Laboratory with a ship model test tank.

Mr R.F. Halliday said in reply that the towing tank in his institution was public rather than private property and that he would be willing to make it available to consultants and others at a modest cost, i.e. such as to avoid making a loss on the employment of several professionals and two tradesmen. He pointed out that models cost of the order of $1,000 and that prospective users should not stint on this item. He also referred to the fact that some designers found it rather easier to visualise from models than from the drawing board.

DISCUSSION OF PAPER NO. 3

Mr M. Doherty (Eken & Doherty Pty Ltd.) was concerned at the balance between amounts currently being spent on fishing vessel research and the inadequate sum spent on market research.

Mr W.C. Newling (Waugh & Josephson Limited) considered the market to be the limiting factor. He felt that importation of processed fish would be reduced if processing plants were more widespread in Australia.

Mr H.E. Rogers (Fisheries Division, Dept. of Agriculture), noted that research trust accounts and direct treasury grants for fisheries research had amounted to more than $3 million since 1971 and referred to the existence of the Fishing Industry Research Committee.

Mr A.G. Smith (A.G. Smith Associates) thought that more research attention should be given to items on the vessel : there were too many refinements from inshore which did not stand up to conditions at sea. He thought that more than 50% of ships' downtime arose from equipment faults on "gadgets" which may have been installed to save a mere 1% in fuel costs.

Mr R. Rutherford (Sanney & Associates), queries the previous contribution. He thought that the "gadgets" had been installed to reduce crew numbers and that it was worth persevering with them in order to reduce very high crew wage bills.

Dr F. Mistree replied by referring to the Commonwealth yearbook as a source of statistics. He also suggested that care needed to be taken in defining the simplified vessel referred to by Mr Smith.

He summarised his replies by saying that we needed to identify both short term and long term goals for the industry and we needed to decide which sector Australia might specialise in. All this was a job for an Industry Council, properly constituted to reflect the range of legitimate interests in the industry.

DISCUSSION ON PAPER NO. 4

Mr K. Hope (Department of Defence (Navy)), referred to some inconsistencies in sea-state statistics from references 12, 17. He thought that the range of the "Attack" class boats was

underestimated and that this would have an effect on cost-benefit conclusions. He also thought that cubic dependence of cost on ship length was only true for small changes in length.

Reply by Mr S.S. Schaetzel

I agree with Mr Hope that there is no consistent statistical sea-state data for the various areas around our coasts and my use of a particular reference was to stress the point that in a majority of cases the sea state will be below a given value and hence suitable for small ship operation. Whether the figure above which a small ship cannot operate comfortably is 4% or 14% is immaterial and the importance of this parameter should come out n an overall cost-effectiveness study. We all know however, how much it costs to squeeze the last few percent of performance from any system.

Mr Hope quoted various references - and I would like to quote one to him which might be a bit of an eye-opener. The book ("Watch Off Arnhem Land", by Capt. C.T.G. Haultain, Roebuck Society Publication 1971), was written by a man who did things, rather than analyse them. It describes the nearest thing to a Coastguard Service we ever had and refers to the use of a 45 ft. boat "LARRAKIA" in 1936-1938 on what was known as Northern Territory Patrol. In addition to Air/Sea rescue duty for QEA aircraft in the Timor Sea, the main task for the boat was patrols against Japanese pearling luggers operating in territorial waters. Capt. Haultain in order to perform his duties, was acting officer of Customs and Immigration, Acting Inspector of Police and Pearling and Protector of Aboriginals. (Of course these days such a simplification would not be possible, and separate Public Servants would have to be carried). The most interesting point is, however, the fact that the boat in question was 45 ft. long and operated from Timor to Cape Arnhem.

The main complaint of the operators was the unreliability of its three petrol engines and the cramped crew quarters. Sea-keeping did not seem to be a problem. The specification of the boat is contained below.

Considering the cost-length or displacement curve, it is important to compare like with like and consider patrol craft only and not ships in general. It is well known that the length-cubed law does not apply to large tankers. It may be of interest to note at this stage that supertankers are probably the cheapest engineered hardware existing, with costs below $1 per pound weight. This compares with $1.5 per pound for standard passenger cars and $12/lb for the cheapest aircraft, ending with $240/lb for F111.

I do not want to sound too gloomy, but Mr Hope will find, when examining the returned tenders for the new patrol boats, that their cost will conform to the L^3 curve taking, as a starting point, $280 k for a 50 footer.

"Spares for motors and hull fittings were a constant anxiety. The source of supply was ten thousand miles away and months elapsed before replacements could be obtained. The initial establishment of spares included one complete motor, and lasted nearly two years

of hard service, supplemented by one batch of parts from England. An enormous amount of improvisation was done, and reached its peak during Cassidy's term as engineer.

Modifications in the basic design of the boat had had to be made to fit the needs of the long 500 miles haul across the Timor Sea, and had drastically reduced her speed performance figures. Though lower speed did not materially affect patrol operations, it was a matter of concern in Air/sea rescue work.

Data:
Builder & Designer: Scott-Paine and Co., Hythe England
Length: 45 feet
Breadth: 9 feet 9 inches
Draught: 3 feet 3 inches (full load) 2 feet 9 inches (light)
Power Plant: 3-100 hp Meadowes motors, driving three screws. Direct Drive.
Petrol Tankage: 840 gals. carried in five tanks. Main and forward tanks removed at end of 1936, leaving 430 gal. supply.
Fresh Water: 40 gals. for all purposes
Petrol Consumption: 1.2 gals. per mile. This surprisingly enough was constant at all speeds up to 15 knots. At 20 knots it rose to 1.7 gals. per mile.
Speeds attained on operation: 10.5-15 knots at full to light load on 2000 revs; maximum speed light load - 20.5 kts on 2500 revs.
Oil Consumption: 0.6 pints per engine per hour. Oil seal leaks often doubled this figure
Petrol grade: 77 octane (the highest commonly obtainable at the time).
Oil grade: Winter S.A.E. 50
Summer S.A.E. 70
Engine Temperature: Summer 70°-75° (Cent)
Winter 62°-65° (Cent)
Displacement: No load - 5 tons.
Full load: Petrol, oil, water, armament, ammunition, engine spares, stores and provisions for 30 days, and crew etc. - approx. 11 tons.

Consideration must be given to the length of patrols when assessing performance, and maintenance problems. The Royal Air Force boats were never expected to cover more than 250 miles at one time. Our Arnhem Land cruises were to the order of 1000-1800 miles.

It was most galling to us all when uninformed opinion scoffed at 'Larrakia's 'breakdowns, without a thought to the conditions under which that gallant little boat laboured. "

CLOSING ADDRESS

by

MR. M.D. PEARSON

Branch President
R.I.N.A.

You have before you a draft resolution of the Australian Symposium on Small Ships. There have been several pessimistic statements about the small ship industry and we feel it is appropriate that some resolution on this matter be sent to the appropriate Australian Government Ministers who we consider are the Ministers for Agriculture, Defence, Manufacturing Industry and Transport.

Now I will ask Professor Fink to move that this resolution be transmitted to the appropriate Ministers and speak on the motion.

Professor P.T. Fink (University of New South Wales)

Thank you, Mr. Chairman. Members of the Symposium will appreciate that none of the sponsoring bodies can be party to political statements but we have come up with a resolution which is hoped to meet the wishes of the Symposium without appearing either too partisan or too weak. I felt greatly stimulated on reading the summary of the recently published study of the manufacturing industry, the green paper produced under the chairmanship of Mr. Gordon Jackson, General Manager of CSR Ltd. This has looked very seriously at the ills which beset so much of our industrial endeavours and pointed a finger at even more factors than were exposed in this excellent symposium.

I therefore took the liberty of using some words straight out of the Jackson summary. We do believe that the small ship industry should be regarded as "... a capability considered desirable for reasons of national independence and that its use was to be encouraged ..." Since we are talking of a class of industry which appears to need government support all over the world, we do not need to feel too ashamed to have that sentence in our resolution.

The Jackson Committee's proposals in favour of the establishment of industry councils, "with priority for those facing serious policy problems of major structural change ..." also appeared to be directly applicable here. The Canberra Shipbuilding Industry Forum of September 1975 concluded with a similar proposal for that industry but I have used the term ship-industry in order to reflect the interaction of the many aspects represented here. It seemed wrong to focus attention on any one of them alone. I do not expect the final sentence to arouse opposition: we do look forward to sympathetic consideration by government of the problems faced by all sectors of the small-ship industry.

SEE PAGE C-vi FOR TEXT OF RESOLUTION

Mr M.D. Pearson

Thanks Professor Fink. Would any one else like to comment on this? I believe you have all read it.

Mr L. Glover

I would just like to say that the enemy of symposiums and forums or whatever you would like to name them is complacency. You come here, you pay your money and you go away and then approach the Government and put up a submission. Someone says they're very busy, they're always busy and complacency will kill this symposium, it will kill the forum in September. You can't get away from the meeting like this and leave a resolution by someone to go ahead to the Government. That isn't the end, there has to be back up support. Industry, a fisherman, small shipbuilders and consultants just can't back off this committee and say - good, we've had a resolution, Professor Fink will put a great submission to the Government. It doesn't end there.

Each group, consultants, shipbuilders, small shipbuilders, fishermen, researchers, Universities, if you just back off and let this minute go to the Government then you might as well not have had this meeting, I've wasted $50. We all have, if this is the outcome. You must support this minute that goes to the Government by industry and group support. Without back up support of any resolution passed by anything I can name - a committee, a symposium, a Jackson, a Bill and Jack and Tom and Fred, it means nothing unless the industry group support it. I would like each of the groups of consultants, small shipbuilders, Universities, owners, builders to make sure that this minute that goes forward has their support and backing and that this doesn't just rest as another bit of paper on some Minister's table and that it does get support as I feel that if we don't do it then we may as well not have come here.

After further discussion the motion to forward the resolution to the appropriate Ministers was carried by the Meeting.

Mr M.D. Pearson

It falls to my lot to give the closing address of the symposium and I'm in the fortunate position that I can say what I like and there will be no questions afterwards.

This has been a very successful function in my view, in the number of people attending, the diversity of papers read and diversity of the views expressed.

The papers and discussions in the first session produced the usual heated arguments on fitting equipment and features for statutory requirements into small ships. Now small shipbuilders haven't got that on their own. It also produced some information on the status of the deliberations between State and Commonwealth authorities on uniform regulations and it is to be hoped that they come to fruition in the not too distant future.

One point of note in the latest series of papers was the difference of opinion in the value of design and build tenders.

Personally I do feel that a design and build enquiry does give an element of competition between builders, which sharpens their, or their consultants ideas, it also allows the builders to offer a proposition that suits their yard practices instead of something that suits some other yard's practice and it should therefore result in the shipowner getting the benefit of different ideas for his requirements, and probably in the overall cheapening the job to the shipowner. The cost to the builder of the design, if he gets the work, of course he gets back, but in any case I think we all need a lot more experience in that area in the yards.

The financial papers in the Symposium, or in any symposium, are always good for an argument, I think that's one of Parkinsons law, that everyone can talk about money and these ones, particularly that of Mr Glover were no exception.

We did receive from Mr Clarke, some good news about the bounty legislation in that the Government are prepared to look into amending this for small ships and I do hope on behalf of the large shipbuilders present that they do the same thing for us too because we have the same grouches.

The question was raised in the Forum as to whether shipbuilding in Australia is a necessary industry. In the small ship context, my view is that the answer must be yes and whilst Mr Doherty feels that Australian prices are getting exorbitant, I feel that if we had no local industry at all and relied on the importation of small ships, the overseas price for a product to suit Australian requirements and not necessarily overseas requirements, and there is a world of difference there, would quickly rise and would in itself become prohibitive and unless there's a period of dearth in overseas shipbuilding orders, the delivery would get out of the picture too. So I feel in this way that an active local industry is essential.

Coming to the meetings this morning - there was a wealth of discussions on the proposed fisheries and oceanographic research ship which would appear to be a very costly venture and could be a major problem to the shipbuilder who gets the contract when it comes.

Cost of supply ships was touched upon in another paper then but I don't think we arrived at any definite conclusions as to why the disparity was there.

One interesting point to me raised in the discussion on Professor Pauling's paper on stability was the concept of heel with no trim, which will in the near future no longer be acceptable to the Department of Transport for vessels such as drill rig supply ships and presumably anything with large erections and I can see these requirements are going to make a lot of problems for the Naval Architects on the smaller ships.

The next session this morning commenced with a statement from Mr Ross Hawke that the larger yards were tending to move in to the field of the smaller yards because of the drying up of orders on large ships and consequently there was a general step down and squeeze all down the line. The market for small ships

was discussed in particular incentives for export orders. In this connection we should bear in mind the problems of exchange rates. For instance in the past 5 years from 1971 the Australian dollar has appreciated approximately 32% when compared with Sterling, which rather makes a nonsence of the original subsidy ideas. This movement of currency obviously does not assist us at all in competing in an export market.

The next papers on materials other than steel, in particular aluminium, GRP, Ferro-cement and wood produced many interesting questions and it was obvious that the organisers could have allowed more time for that discussion.

In the first sessions this afternnon details were given on recent sea keeping trials on the Attack class vessels. These trials confirmed, at least to me, that considerable thought is required in considering the arrangements on this type of vessel in the early design stages for serviceability and also probably more importantly habitability. I know from my own experience many years ago in somewhat larger vessels in probably somewhat similar conditions that efficiency tends to drop tremendously in conditions acceptable in peace time it can be mighty dangerous in times of war. It is refreshing, however, to have a paper like this and to hear the uninhibited discussions of the Naval people on this matter. Discussions on the harbour ferries seemed to largely be centred about the problems in demolishing the wharves in Sydney harbour. I don't know, the whole thing got away from maintenance and operations there.

I must on behalf of the committee, thank Captain Abbott and Mr Fitzgerald for their very interesting contributions on tugs and trawlers in the same discussion.

In the last session one of the main themes that came through to me was the urgent need of communication with overseas authorities and learned bodies of research and this as Tom Fink states requires that in Australia we produce more papers ourselves for reading at overseas technical sessions as in general one can't get unless one gives. So we have to be prepared to prepare and read papers at overseas technical sessions. As Tom Fink says in the hydrodynamic side we have been doing very well, we've had a remarkable small body of men who have been doing all the work there.

Coming to one other point on that question, the question of research, I think in the discussion on testing tanks, we rather lose sight of the fact that this is a small ship Symposium. We should really have considered in my view greater use of the facility we have at present and where it's practical to use it. Obviously from the question or comment from one practising Naval Architect, one of the first things we have to do is talk consultant Naval Architects into the idea that there is a testing tank available in Australia that can be used for something and should be. The costs of using the Australian tank would appear to be well below the costs we pay for using overseas tanks and it does appear that we could at reasonable cost get quite a lot out of what there is available at Sydney University.

Among those attending the Symposium are Mr Lee from the United Kingdom, Mr Ayers, Doctor Bowen from New Zealand, Mr Halsted from Port Moresby and I apologise to any other overseas visitors who I have missed out. The organisation of this symposium was a joint affair by the Royal Institution of Naval Architects and Institution of Marine Engineers with the Department of Transport as an additional co-sponsor. The organising committee was chaired by Bob Campbell of the Department of Transport and the other members of the committee were Professor Fink, and Cecil Boden primarily of the Naval Architects, Keith Murray and Don Gillies of the Marine Engineers and they all were ably assisted as Secretary by Alan Mitchell, who I assume had to do most of the work, and with Stuart Clarke and Bob Herd also being involved and assisting on behalf of the Department of Transport.

On behalf of the Institution and Institute I would like to thank these members of the organising committee for organising and running a very successful symposium. I would also like to thank Doctor Mistree and all the University staff who have helped with the tape recorder and also the girls outside who have done such an able job in running that part of the business, Mrs Isobel Waters, from the University and Miss Virginia Spring and Miss Karen Forster from the Department.

Finally, I would like to express our thanks and appreciation to the Vice-Chancellor and the staff of the University of N.S.W. for making this magnificent building and the facilities available for the symposium.

I now declare this part of the proceedings closed.

RESOLUTION OF THE AUSTRALIAN SYMPOSIUM ON SMALL SHIPS *

The 'Australian Symposium on Small Ships', held at the University of New South Wales on 4th, 5th November 1975, attracted 220 registrants from all sectors of the small ship industry to discuss 30 expert papers on:

Role of small ships in the Australian scene

Financial basis for a small ship industry in Australia

Design of small ships, their machinery and equipment

Building of small ships in Australia

Operational experiences in Australia

Uniformity in Australia of small ship rules

Research in the small ship field.

A forum discussion was held on "the future of small ships in Australia". The small ship industry was identified, in the words of the recent Green Paper of the Jackson committee to advise on policies for the manufacturing industry, as "... a capability considered desirable for reasons of national independence ... and that its use was to be encouraged ....".

It also endorsed that committee's conclusion in respect of the ship industry that "... for each industry group, with priority for those facing serious policy problems of major structural change, an industry council is suggested". The participants in the Australian Symposium on Small Ships look forward to sympathetic consideration by government of the problems faced by all sectors of the small ship industry.

* to be sent to Australian Government Ministers of Agriculture, Defence, Manufacturing Industry, Transport.