INTERNATIONAL CATAMARANS PTY. LTD.

NOVEMBER 1982


# DEVELOPMENT OF A SERIES OF FAST CATAMARANS IN AUSTRALIA

By PHILIP C. HERCUS B.Sc. (TECH) M.R.I.N.A.
Director
International Catamarans Pty. Ltd.
Sydney, Australia.

# DEVELOPMENT OF A SERIES OF FAST CATAMARANS IN AUSTRALIA

## INTRODUCTION

Over the past six years International Catamarans Pty. Ltd. have developed a series of fast catamaran craft in Australia. To date the vessels have been used in passenger carrying roles, but the company have recently won an order for the construction of two oil field utility vessels and are currently engaged in adapting the designs for use in other roles. This paper traces the historical development of the vessels with digression to examine the special features of the catamaran type.

Fourteen International Catamarans vessels are now in service in Australia, New Zealand and The People Republic of China. This paper will also review adaptations made to the basic design concept to meet special requirements of each type of Ferry service operated.

**International Catamarans Pty. Ltd.**

Hobart Office: 1 Secheron Road, Battery Point, Tasmania, Australia, 7000.
Telephone (002) 34 8021, 34 3296
Sydney Office: 4 Help Street, Chatswood, N.S.W., Australia, 2067.
Telephone (02) 411 1725

Telex: AA 72710 INCAT

## HISTORY

International Catamarans, both the company and the craft, have grown from the combination of two areas of expertise. In 1975 Sullivans Cove Ferry Co. were operators in Hobart and Hercus Marine Designs were consulting Naval Architects in Sydney.

A shipping accident in Hobart severed the Tasman Bridge which links the city's Eastern and Western shores. The alternative road access between the two communities was hopelessly inadequate and involved a detour of at least 30 miles.

There was an obvious need for expanded ferry services and Sullivans Cove was one of the organisations which moved to supply the need. They increased the capacity of their two existing vessels and in very quick time built two additional ferries. All these craft were conventional monohull steel vessels capable of carrying 150 to 300 passengers at about 10 knots.

It was envisaged that the bridge would take 2-3 years to repair and in the interim the situation was a ferry operator's dream. However Sullivans Cove looked to the future and decided that there were long range prospects to maintain ferry services after the bridge had been restored. Obviously the prospect would be better with a more modern design concept giving greater speed and passenger comfort.

The company chartered a rigid side wall hovercraft and put it into service. The passenger response was excellent even though a premium had to be charged on the prevailing fare. Despite this the vessel was not an economic success. It was plagued by mechanical problems and proved incapable of operating a reliable service.

Sullivans Cove felt there had to be a better way and through their Managing Director, Robert Clifford, undertook an extensive study of alternative craft. The outstanding characteristic of the craft investigated (they were all high performance craft) was their mechanical complexity and high initial cost. While such characteristics might be accepted on high density routes where back up craft and advanced technical support were available these conditions were not met in Hobart.

Eventually attention was concentrated on a simple catamaran design.

At this juncture Hercus Marine Designs were retained, initially to draw a preliminary Lines Plan. A model was made and a tank testing programme was undertaken at Sydney University. The results were most encouraging.

## STRUCTURAL DESIGN

Still feeling their way and keeping tight control of the costs Sullivans Cove commissioned the structural design. For simplicity of construction it was decided that the hull should be of welded steel. Scantilings were taken out using conventional classification rules but were judged to be too heavy. Tank testing had been undertaken at varying displacements and the penalty of excess weight was obvious.

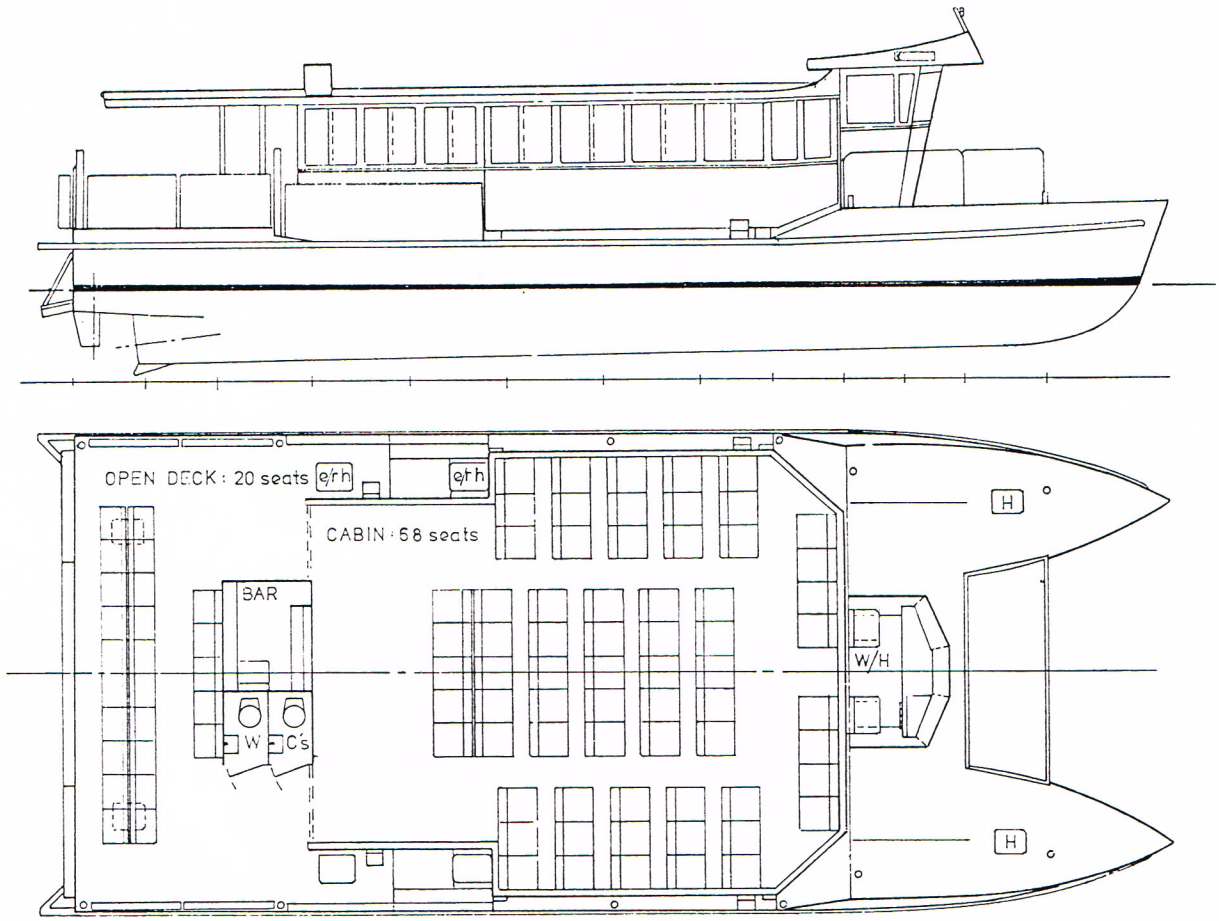
It had been decided that the vessel would be built under survey by the Navigation and Survey Authority of Tasmania and appropriately they were consulted to determine minimum structural requirements. They indicated willingness to accept structural design based on Det Norske Veritas Tentative Rules for the Construction and Classification of Light Craft. It was noted that the rules specifically excluded multi hull craft but it was believed the rules could be safely applied to each individual hull and the bridging load subsequently superimposed.

## SUPERSTRUCTURE SUSPENSION

From the beginning the owners had insisted on one highly novel feature — they wanted the superstructure built as a separate unit and mounted on anti-vibration mountings. This, it was hoped would isolate vibration and minimise noise in the passenger compartment. With this system adopted it was decided not to rely on any assistance from the superstructure in joining the two hulls. Further, the superstructure floor could be strengthened to accept water impact loads and a significant overall weight saving made by eliminating structure between the hulls under the superstructure. The hulls were joined by short structures forward and aft of the cabin. This produced a simplified bridging design concept in that each end of each hull was considered cantilevered from the adjacent hull.

Much time and effort was devoted to the selection of the superstructure mounts. Finally it was decided to use approximately a dozen air bag type anti-vibration mountings in conjunction with rubber buffers for horizontal location. Subsequently these mountings proved to be most effective but did pose a problem due ot their very large horizontal and vertical deflections under load. Furthermore, the vessel's crews never seemed to get around to maintaining air pressures in the bags. After the first 4 vessels the bags were superseded by solid rubber mountings. When soft enough rubber has been used these mounts have given lower cabin noise levels than the air bags. With the superstructure insulated from the hull by the resilient mountings it was a logical decision to adopt an aluminium superstructure.

Apart from the twin hulls and resiliently mounted superstructure the design concept was very conventional and allowed quite standard machinery and systems to be used for propulson, steering, pumping etc. The only proviso was that weight had to be carefully controlled.




**M.V. JEREMIAH RYAN**

FIG. 1

## "JEREMIAH RYAN"

At this stage Sullivans Cove Ferry Co. found the courage to proceed with construction of the vessel, subsequently named "Jeremiah Ryan". A general arrangement is shown in fig. 1. The Owners had previously built a number of vessels using sub-contract tradesmen in key areas with assistance given by off duty ferry crews during the middle of the day. They elected to use the same system to build the catamaran.

Construction proceeded remarkably smoothly considering the novel characteristics of the vessel. Minor delays and aggravations occurred trying to find lighter ways of doing basically conventional jobs, but the only problem of any real significance was that time was rapidly running out. It became touch and go whether the vessel would be commissioned before the bridge was repaired and re-opened.

In the end the boat was completed three weeks before the bridge, and entered service amid much publicity. It was an outstanding success. The Catamaran was fast, comfortable, quiet, vibration free and most important, could be operated profitably at exactly the same fare structure as the conventional slow speed ferries. The only significant adverse criticism centered on appearance — the boat looked dreadful.

## COMMUTER FERRY SERVICE

"Jeremiah Ryan" went into operation on the commuter ferry services in Hobart. The city business centre lies within half a mile of the main shipping wharves. One of the wharves had been converted to a ferry terminal. On the other side of the Derwent River at Bellerive a ferry terminal had been built with a large carpark and a bus interchange. A similar but smaller terminal had also been built at Lindisfarne further up river. The ferry distance to Bellerive was about 2 miles and to Lindisfarne was about 3 miles.

When "Jeremiah Ryan" entered service she became the 5th Sullivans Cove boat working in conjunction with 3 Government run ferries and 3 other private boats. The vessels operated basically a "quick-on, quick-off" shuttle service.

Operation of the vessel allowed some interesting comparisons. Firstly, it ran alongside vessels having twice its passenger capacity at half its speed. It proved capable of halving every aspect of the bigger vessels' timetable. It loaded and unloaded passengers in half the time — it manoeuvred in half the time — its transit time was half that of the bigger vessels. Its fuel consumption per mile was a little higher than that of the conventional craft but being smaller it required one less crew. It offered commuters the enormous advantage of providing twice the frequency of service. In off peak hours a minimum frequency of sailing must be maintained as a public service. The fast ferry was able to replace two conventional vessels by making alternate trips on two different routes.

Regrettably, but perhaps predictably, the Hobart ferry fairy tale had to end. The bridge reopened and commuters took to driving their cars from home across the bridge to work. Alternatively they caught a bus near home and ultimately got off a bus at their destination. Ferry services have never been able to compete with such alternative transport unless of course the alternative has been severely overcrowded. Hobart was no exception and ultimately patronage dropped too low. The ferry services were abandoned.

In the meantime much interest had been aroused by the catamaran and it wasn't long before a charter was arranged in North Queensland. Here the vessel operated trial services to a number of resort islands off the coast. Again the concept was a great success but "Jeremiah Ryan" proved to be a little too small for the services and the sea conditions experienced. "Jeremiah Ryan" ultimately returned to Hobart and now runs tourist and charter cruises.

While "Jeremiah Ryan" was not the ultimate boat it had proved the viability of the concept. In addition, the long delivery trips to and from Queensland had turned up an unexpected bonus. The vessel proved to be an exceptionally comfortable seaboat.

## TURNAROUND TIME

It has long been recognised that quick turn around is of utmost importance in shuttle type ferry services. This is highlighted by the results of a recent investigation into the hydrofoil services operated on Sydney Harbour. These run from the city center at Circular Quay to Manly — a distance of approximately 6 nautical miles. Each hydrofoil operates on a 20 minute time slot. From the time lines are let go at one terminal to the time lines are on and gangways down at the other end averages about 15 minutes. During peak loading times the traffic tends to be one way. Unloading time is approximately 2 minutes leaving a 3 minute buffer time. The hydrofoils carry a maximum of about 140 passengers and while flying average about 31 knots.

The vessels berth bow-in at finger piers and on leaving have to back out and turn. At Circular Quay the vessels have to transit a restricted speed zone before entering the main harbour.

As can be seen from fig. 1 "Jeremiah Ryan" was built with approximately 3 metre wide gangways right at the aft end of each side of the vessel. These allow two advantages:

1) They allow 2 traffic lanes to develop — one from the near side of the vessel to the forward end of the gangway — the other from the outer side, around the bar/toilet block to the aft end of the gangway. The vessel could unload her full capacity of 145 passengers in less than 1 minute.
2) The stern is the "live" end of the vessel. Berthing approach is made about 1 metre clear and then the stern is "kicked in". A line is secured and then the gangways can be lowered and passenger unloading commenced while the bow of the vessel is brought in, swinging on the line. There is no necessity to wait until the vessel is hard alongside as is required with midship gangways.

"Jeremiah Ryan" and the successive catamarans have all shown great acceleration. They have regularly been timed from a standing start to 20 knots in about 10 seconds. In practice this acceleration would throw many passengers off their feet but it does show that the vessels are not fettered by long take off times as are hydrofoils and hovercraft.

## SPEED SELECTION

Returning to the hydrofoil timetable it can be demonstrated that the catamaran could save two minutes on the hydrofoil's time in the vicinity of terminals. This would allow the existing 31 knot service speed to be reduced to about 26 knots yet still maintain the same timetable. If for some reason only one minute could be saved in the terminal vicinity the service speed could be reduced to about 28.5 knots again still maintaining the original timetable.

There are proposals to increase the current passenger carrying capacity of vessels on this service to about 250. Given environmental and service conditions this would require a catamaran ferry of approximately 24 metres length. Power and fuel consumption to obtain the above speeds are given in the following table.

| Service Speed (knots) | Power (HP) | Fuel consumption (imp. gal/naut. mile) |
|---|---|---|
| 31 | 2 x 1400 | 4.11 |
| 28.5 | 2 x 1150 | 3.67 |
| 26 | 2 x 950 | 3.33 |

It is interesting to note the power required for a 31 knot service speed. The existing hydrofoils on the service use virtually the same power (1350 horse power each side) to achieve the same service speed carrying less than 60% of the passengers carried by the catamaran.

## INTERNATIONAL CATAMARANS

The potential of the catamarans was undoubtedly there so in 1978 the expertise of Sullivans Cove Ferry Co. and Hercus Marine Designs was pooled in the formation of International Catamarans. Initially orders came slowly and the first three years produced only three vessels. One for the tourist industry in Tasmania and two for the tourist industry in New Zealand. These craft were similar in having steel hulls of 18 to 19 metres length. Superstructures were all aluminium, still mounted on air bag type anti-vibration mountings. Speeds ranged from twenty to twenty seven knots and passenger capacities from 100 to 150. Each craft was greeted with new enthusiasm by passengers and owners alike and in New Zealand the second order came from the first customer returning for a repeat vessel.

## "FITZROY"

In late 1980 an order was secured for "Fitzroy", a 20 metre all aluminium vessel to work in the North Queensland tourist industry. The general particulars of the vessel are the same as those given for her sistership "Quicksilver" on the following Specification Sheet. "Fitzroy" subsequently proved to be almost as significant as the original "Jeremiah Ryan".

Firstly, being all aluminium she was significantly lighter than a comparable steel vessel. The reduction in lightship weight was approximately 8 tonnes which represented a saving of approximately 20 percent on the full load operating displacement. With the hull form used on these catamarans power is approximately proportional to weight. The switch to aluminium yielded a reduction in fuel consumption of approximately 20 percent. Subsequently it was discovered the aluminium vessel could be built for the same or a lower price than a steel vessel of the same carrying capacity and speed. The aluminium cost is significantly more than the steel cost but there are worthwhile savings to be made in fabrication time and in painting time. Furthermore, the reduction in weight allows a reduction in installed power and the lower cost of engines, shafts, propellors, etc. makes up the balance.

"Fitzroy" was also significant in being the first vessel specifically designed for offshore service. The earlier steel hull catamarans had all been designed for service within partially smooth water limits i.e. on bays, esturaries, in rivers, etc. "Fitzroy" was to operate up to fifty miles offshore making daily trips to a resort island with extension to the Great Barrier Reef on approximately three days per week. The principal changes for offshore service were generally increased freeboard, improved forward end fairing of bridging structure and increased deckhouse scantlings, window thicknesses, etc. Lifesaving appliances were also upgraded.

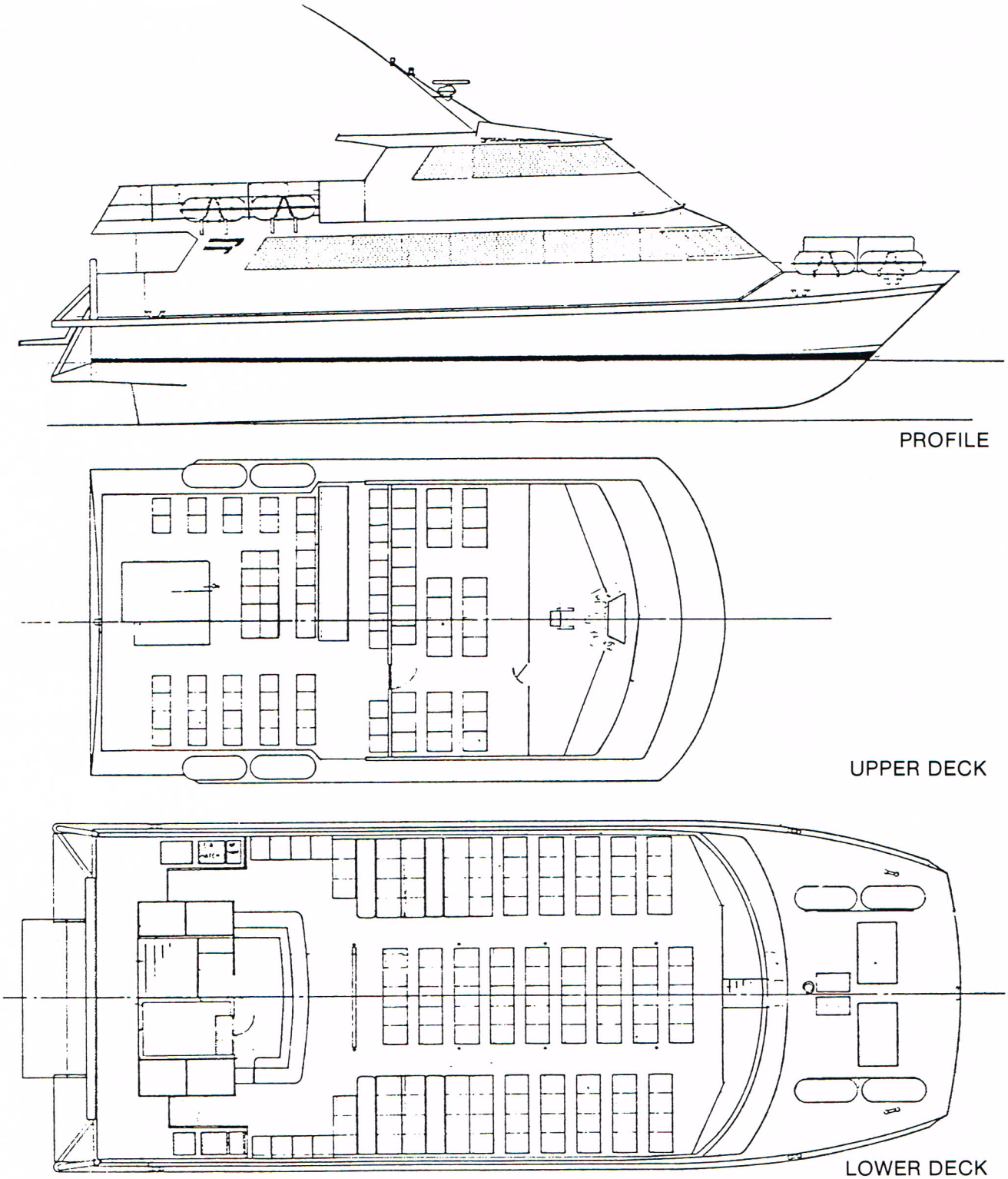
As has been noted previously, "Jeremiah Ryan" was no aesthetic masterpiece. The three later steel hull vessels and now "Fitzroy" were all to work in the tourist industry. Operators stressed the need to improve appearance of the craft and commented most desparagingly about our achievements in this regard. There was much general relief when "Fitzroy's" appearance attracted far more compliments than criticism. Today she looks quite stodgy by comparison with the latest vessels.

## LIFTING RUDERS

"Fitzroy's" final claim to fame lay in her rudder system. The second catamaran built had proved a little slower than anticipated. At one stage attention was focussed on the rudders and it was felt they may be creating undue drag. The vessel was taken into shallow water and the rudders and stocks were dropped out for retrieval at low tide. The vessel then ran trials without rudders and revealed an increase in speed of between one and one and a half knots. While this was not a large speed margin it did represent approximately 5% difference in power and consequently fuel consumption. As such it was seen to be worthy of further investigation.

Over a period of about two years various alternative steering systems were examined. From the very first vessel all had featured an extension of the bottom plating beyond the transom to form a planing wedge or trim tab. This structure was approximately one metre long and was held in fixed position by brackets from the transom. It proved to be an ideal position to fit the Lifting Rudder system finally devised.

Each hull has a rudder set at a fixed angle from the centreline. The port rudder is set to steer the vessel to port and the starboard rudder to turn to starboard. When the boat is moving in a straight line, the rudders are held out of the water. To turn the boat, one rudder at a time is dipped into the water through a slot in it's trim tab. Rather than varying the rudder angle as on most boats, the rudder is raised and lowered, controlling steering by changing the area of the rudder under water. As each rudder only has to steer one way it is cambered accordingly for greater efficiency. This system is now successfully in service on 5 catamarans and is being fitted to all new vessels.




**M.V. TELFORD REEF**
FIG. 2

## TOURIST FERRIES

"Fitzroy" entered service at the end of June 1981, and like her predecessors, proved extremely popular. Within two weeks of her starting work, orders had been confirmed for two further vessels and negotiations commenced which have yielded five additional orders. With one exception, all these later vessels were to work in the tourist industry in Queensland. Their operation is a little different to the commuter ferry. Firstly, while the commuter vessel may work up to 18 hours a day the tourist vessel seldom runs more than 6 hours a day. In many cases this allows somewhat higher engine ratings to be used.

Loading and unloading facilities differ considerably. A commuter ferry usually works to specially designed terminals and gangways are arranged to suit for rapid passenger movement. On the other hand

many of the tourist ferries work to a number of wharves of different heights, etc. These conditions require versatile gangway arrangements which may slow passenger movement. Also time is less pressing in the tourist industry.

As previously noted the appearance of the craft is of utmost importance. In many instances they appear prominently on promotional material. In other cases a more attractive vessel on the wharf will gain greater loads.

The layout of the tourist industry vessel requires adaptation to suit the requirements of the service operated. The majority of the vessels are required to provide fast, comfortable transport to a resort destination or on a sight seeing trip. Voyage times vary between three quarters of an hour and about two hours. Seating must be comfortable and furnishings must be attractive. Of prime importance refreshments and souvenirs must be available for sale on the voyage. Most operators provide complementary tea, coffee and biscuits and supplement their takings significantly by selling alcoholic beverages, souvenirs, confectionary, etc.

A large area of open deck is essential for the out door types though at 25 knots the wind tends to blow a lot of people inside.

Some of the vessels are now operating day trips to the Outer Barrier Reef. Generally, the destinations have no dry land and the vessel is a floating resort when it arrives there. Passengers swim, dive and undertake glassbottom boat tours to view the underwater coral. Interior facilities have to be modified to allow lunch to be served (usually a cold smorgasbord) and to provide tables and chairs to eat at. Because of the predominance of wet bodies in bathing suits, seats and furnishings are slightly different.

Provision must also be made for carrying a glassbottom boat. Typically this would be a flat bottomed aluminium vessel, 6 to 7 metres long. A lifting platform has been devised and is now fitted to the sterns of three of the catamarans. The platform runs on inclined tracks and can be lowered to approximately 200mm below the water level to allow the glassbottom boat to be floated on and off. The platform can be raised clear above the tunnel between the hulls to enable the boat to be carried safely in transit. In addition, the platform can be locked at an intermediate position for boarding the glassbottom boat or simply for use as a swimming platform.

"Telford Reef", the 14th International Catamaran vessel is to operate Outer Reef trips. Fig. 2 shows her general arrangement and particulars are given on the following Specification Sheet.

## FREIGHT CARRYING

Generally, the passenger vessels are the only means of carrying supplies to resort islands and small quantities of freight are carried on most trips. In this respect the catamaran has huge advantages over alternative craft. The catamaran's exceptional stability allows cargo to be carried on the highest structures of the vessel where loading and unloading access is best. In December, 1981, International Catamarans delivered the 20 metre "Tangalooma" for service between Brisbane and Tangalooma Resort on Moreton Island. She provides an excellant example of adaptation of a basically standard vessel to carry resort supplies.

Racks are fitted each side on the main cabin roof to accommodate standard 46 inch square timber pallets. Supplies are delivered palletised or are so assembled at the owner's city terminal. The pallets are loaded direct on to the vessel by fork lift truck. The only drawback with this system is that the vessel must be turned around to load pallets on the opposite side. However, diesel fuel is also carried to the resort and it is common practice to balance palletised cargo on the port side with fuel loaded in the starboard hull. "Tangalooma" meets all stability requirements with 15 tonnes of freight carried on the upper deck cargo racks and her survey approves carriage of this cargo. In practise the owners try to schedule freight for trips when passenger loadings will be lower to avoid slowing the vessel down with the excess weight.

A logical extension of this concept would be to lift off all or part of the passenger cabin and replace it with freight containers. This would allow a major freight carrying activity perhaps at night. Of course, it does presuppose the availability of heavy cranage for handling the modules and this facility is not generally available in normal resort operations. The resiliently mounted superstructure incorporated in all International Catamarans particularly lends itself to this lift-on lift-off concept.

## SEAKEEPING

While only designed for sheltered water operations the first four vessels had performed more than creditably in bad weather conditions. The only real problems encountered were firstly, "Jeremiah Ryan" suffered from insufficient tunnel clearance in way of the bridging structures connecting the hulls and secondly, two of the early vessels lacked sufficient rigidity in the superstructure floors. When an occasional wave hit the bottom of the superstructure the impact was transfered through to the passenger seats above causing some consternation. The height problem was readily rectified with a little more freeboard and modified foredeck and bridge configuration. It is impractical to raise the tunnel to avoid

wave impact entirely. The increase in freeboard reduced the incidence of wave impact but also the superstructure floor was redesigned and strengthened to avoid localised shock loadings from wave slap.

"Fitzroy" and the subsequent catamarans have proved to be extremely good seaboats. This appears due to the following:

1) Hull Form.
   These vessels feature an extremely fine waterline entry and an extremely deep-V hull form. They are able to cut through a wave or to fall into the water without any significant impact. Technically the vessels plane but essentially the hulls are exceptionally fine displacement form. This means they run in the water rather than on it and consequently do not follow the water surface over the waves and into the troughs in the same way that a planing hull would do. This hull design philosophy appears to differ from most other high performance craft.
2) Speed.
   In all but extreme sea conditions ride is definitely better at high speed. With the fine hull form easing passage through waves the vessel's path largely averages out the wave contour.
3) Hull Spacing.
   When moving diagonally to the seas the vessels benefit from an apparent lengthening effect. Essentially the length becomes that from one bow to the opposite stern. It is always difficult to quantify the benefit of such phenomena but under such circumstances a 20 metre catamaran appears to match a 25 to 30 metre monohull.
4) Stability.
   A catamaran's exceptional stability is traditionally assumed a disadvantage in terms of seakeeping. However experience has shown it reassures passengers by avoiding large rolling angles. The vessels' rolling motion becomes a little jerky under some conditions but all crews claim they very quickly become accustomed to it and are not adversely affected.

Seakeeping ability is very difficult to measure and to a great degree depends on the sea conditions experienced. Generally the existing vessels are working reasonably close to the coast where a short sharp wind slop predominates. Under worst conditions this is superimposed on a longer swell. Typical bad weather in North Queensland waters is a 30 to 40 knot wind with about 2 metre average wave height and the occasional 3 metre wave. Both the 20 and 22 metre vessels working in this area maintain their normal cruising speeds of 23 to 26 knots under these conditions. The following table gives a seakeeping assessment of the 20 and 22 metre craft in deep open water. In sheltered waters sea states will be lower and higher speeds can be achieved.

Windspeed 15 knots and Sea State 3

| | |
|---|---|
| Up wind | Full speed |
| Across wind | Full speed |
| Down wind | Full speed |

Windspeed 18 knots and Sea State 4

| | |
|---|---|
| Up wind | Reduce to 22 knots or alter course |
| Across wind | Full speed |
| Down wind | Full speed |

Windspeed 22 knots and Sea State 5

| | |
|---|---|
| Up wind | Reduce to 18 knots or alter course |
| Across wind | Full speed |
| Down wind | Full speed |

Windspeed 30 knots and Sea State 6

| | |
|---|---|
| Up wind | Reduce to 15 knots |
| Across wind | Full speed |
| Down wind | Care must be taken not to surf too fast |

Windspeed 40 knots and Sea State 7

| | |
|---|---|
| Up wind | Reduce to below 12 knots |
| Across wind | Good speed can still be maintained |
| Down wind | Good speed can still be maintained |

Windspeed 50 knots and Sea State 8

Vessel perfectly seaworthy, speed restricted with regard to passenger comfort.

## SIMPLICITY

One of the fundamental components in the design philosophy of these craft has been the need to maintain simplicity. Many of the existing and future craft operate in one or two boat situations remote from sophisticated support facilities. Any breakdown of complicated equipment will mean delay and loss of service until maintenance help arrives.

In many cases the general layout or machinery arrangement have been deliberately modified to avoid sophisticated solutions. As an example, the temptation to instal toilet spaces below deck has been strenuously avoided to escape the cost and unreliability of sullage pumping systems. Remember, if it is possible to avoid putting something (like a sullage pump) on a vessel three immediate benefits are gained:

1. It doesn't cost anything.
2. It doesn't weigh anything.
3. It doesn't break down.

## COSTS

By virtue of the simplicity philosophy and a significant power advantage, to date International Catamarans craft have shown significant advantages in initial costs and operating costs over alternative craft of comparable carrying capacity and speed. In all investigations to date surface piercing hydrofoils, planing catamarans and hovercraft have all had at least twice the initial cost of these catamarans. In a couple of instances, conventional planing monohulls have proved competitive on initial cost, but have suffered a significant powering disadvantage leading to higher operating costs and have also fallen way short on seakeeping abilities.

## BUILDING FACILITIES

International Catamarans set out to build craft in their own shipyard in Hobart, Australia. However it took very little time to encounter enormous pressure from many countries for vessels to be built within their own shipyards. Accordingly the Company have moved heavily into technology sales with licencee builders being established in many areas. The Hobart shipyard continues on a small scale to develop new building techniques, test new ideas, keep abreast of costs, etc. As such it remains a most important facility.

In the meantime, licence agreements have been finalised and vessels built in Hong Kong and Cairns, North Queensland. A joint venture shipyard was established in New Zealand and two vessels were built. Unfortunately this arrangement was not successful and licence negotiations are being finalised with an existing New Zealand builder. Negotiations have also been completed in principle with builders in Singapore and on the West Coast of the United States. Particulars of vessels built and building are given in the table below.

**INTERNATIONAL CATAMARANS Pty. Ltd. — Hobart, Australia.**

| Name | Length | Completed | Speed |
|---|---|---|---|
| Jeremiah Ryan (now Derwent Explorer) | 18m | September 1977 | 26k |
| James Kelly | 18m | June 1979 | 28k |
| Fitzroy | 20m | June 1981 | 28k |
| Tangalooma | 20m | December 1981 | 28k |
| Amaroo | 15m | December 1981 | 12k |
| Green Islander | 20m | June 1982 | 28k |
| Quicksilver | 20m | August 1982 | 28k |
| Spirit of Roylen | 29m | December 1982* | 27k* |
| **INTERNATIONAL CATAMARANS (PACIFIC) Ltd. — New Zealand** | | | |
| Tiger Lily | 18m | December 1979 | 22k |
| Tiger Lily II | 19m | January 1981 | 22k |
| **SATIS CONSULTANCY SERVICES Ltd. — Hong Kong** | | | |
| Mingzhu Hu | 21m | January 1982 | 29k |
| Yinzhou Hu | 21m | March 1982 | 29k |
| Liuhua Hu | 21m | September 1982 | 29k |
| Un-named | 21m | Early 1983* | 29k* |
| **NORTH QUEENSLAND ENGINEERS and AGENTS Pty. Ltd. — Cairns, Australia** | | | |
| Green Island Express | 22m | June 1982 | 29k |
| Telford Reef | 22m | October 1982 | 29k |
| Magnetic Express | 22m | March 1983* | 29k* |

* Estimated completion date and speed.

In addition to the above, negotiations have been completed and contracts are expected to be signed in the very near future for an additonal 20 metre vessel to be built in New Zealand and for two 29 metre oil field crew/utility vessels for construction in Singapore and service in Thailand.

## FUTURE DEVELOPMENTS

Current designs have proven economical for service at speeds up to about 25 knots for the 20 metre vessel and 30 knots for the 29 metre vessels. A new lines plan has been prepared and despatched for tank testing. This hull form retains the essential features of the existing craft but it is hoped that refinements incorporated will allow the economical operating speeds to be increased by approximately 20 to 25 percent.

The success with crew boat negotiations in Singapore is most encouraging and big potential is seen in this use. A Norwegian catamaran builder has recently introduced two catamarans to oil field service and it is believed these vessels are working most successfully.

At this stage the catamaran appears an ideal crewboat. Compared to a planing monohull the catamaran offers lower power for a given speed, better seakeeping and much greater freedom in loading deck cargo due to greater stability. It also offers a much better platform on which to mount fire fighting equipment if required. Stability and deck space would also allow the use of interchangeable survey modules if needed.

The catamaran is also seen to offer great advantages for military applications and for fast private pleasure craft. Development designs are being prepared in both these areas.

## CATAMARAN PROGRESS

Inevitably the question arises "if catamarans are so good, why aren't there more of them around?"

The concept of the catamaran is not new. We believe the earliest boats were built by hollowing out logs. These craft were long and slender and presumably suffered from stability problems. It's now thousands of years since some smart soul took two hollow log vessels and tied them together with a couple of smaller logs for mutual support. He was the original catamaran builder.

We can only speculate why catamarans weren't used more. Of course the Polynesians were great catamaran builders and undertook some amazing voyages over a thousand years ago. Probably the greatest single problem has been structural. The rigging loads on sailing craft are very high and an essentially disjointed structure like the catamaran does not readily withstand those loads.

Today we still read of sailing catamarans being lost due to structural failure. In the commercial world however, professional designers and survey authorities are quite capable of calculating the loads on powered craft and ensuring that adequate structures are designed. Quite apart from fast catamarans, in Australia there are a very large number of slow, powered catamarans in service or being built. Bridging structure failure is simply not a problem with these craft.

The structural and design techniques to safely bridge catamarans have probably not been available for much more than a hundred years. The marine industry has always been very traditional and it is only in the last few decades that any real lateral thinking and innovation has developed.

Unfortunately powered catamarans today still bear the stigma of structure and stability failures in sailing catamarans. Many people are unable to perceive the conceptual difference between sailing catamarans and powered catamarans. Yet if a yacht was holed and sank due to the weight of lead on its keel they would see no similarity between it and a monohull ferry boat.

So it can be argued the technological advances and changes in marine industry attitudes necessary to allow catamaran developments are all quite recent and indeed catamaran development is probably right on timetable.

## SUMMARY

The fast powered catamaran is now well established in ferry services. There are many different types of operations and we have touched on the way the catamaran must and can be modified to suit the special requirement of each service.

The simple catamaran presented here may not be the biggest or the fastest or whatever and it certainly won't win any awards for trendy technological development. However when it comes to selecting a fast, economical, reliable ferry it must be considered.

# INTERNATIONAL CATAMARANS News Sheet

NOVEMBER 1982


**THE GREAT CATAMARAN RACE**

PRE-START MANOEUVRES — From Camera: 20m. "Green Islander", 20m. "Quicksilver", 22m. "Telford Reef", 22m. "Green Island Express" and 20m. "Fitzroy".


## INTERNATIONAL CATAMARANS PTY. LTD.

Offices:

**HOBART -** Robert Clifford
1 Secheron Road, Battery Point, Tasmania. 7000
Phone: (002) 34 3296, 34 8021

**SYDNEY -** Philip Hercus
4 Help Street, Chatswood, N.S.W. 2067
Phone: (02) 411 1725, 411 5316

Licencees:

**HONG KONG -** Satis Consultancy Services Ltd.
861 Laichikok Road, Kowloon
Phone: (3) 741 0981

**QUEENSLAND -** North Queensland Engineers & Agents Pty. Ltd.
Buchan Street, Cairns 4870
Phone: (070) 51 6600

Licencees Pending: New Zealand - USA, West Coast - USA, East Coast - Singapore

# THE GREAT CATAMARAN RACE
## CAIRNS, 14th OCTOBER, 1982

The arrival in the small tourist town of Cairns, North Queensland of the first 170 passenger catamaran in July 1981 had an immediate impact on the rival tourist boat operators.

Four more International Catamarans were subsequently ordered and delivered in 1982 to North Queensland tour boat operators. All the vessels to similar designs, are tailored to individual owner powering requirements and layouts.

Intense but friendly rivalry was apparent between the boat crews and on the occasion of the pre-delivery trials of "Telford Reef", a race was arranged.

The Cairns based catamarans carry over 1,000 passengers daily to Great Barrier Reef Islands and not to upset commercial operations a starting time was set at 7.00 a.m.

The result raised a few eyebrows. The dark horse of the race successfully fooling his rivals into believing he was overweight and slow, finished a credible second.

The slowest boat logged 27 knots and the fastest 29 knots.

## INTERNATIONAL CATAMARANS IN SERVICE — OCTOBER 1982

| | |
|---|---|
| Hobart, Tasmania, Australia | Prototype |
| Strahan, Tasmania, Australia | "James Kelly" |
| Bay of Islands, New Zealand | "Tiger Lily II" |
| Auckland, New Zealand | "Tiger Lily" |
| Cairns, Queensland, Australia | "Fitzroy" |
| Brisbane, Queensland, Australia | "Tangalooma" |
| Forster, N.S.W., Australia | "Amaroo" |
| Jiang Men, China | "Mingzhu Hu" |
| Jiang Men, China | "Yin Zhou Hu" |
| Cairns, Queensland, Australia | "Green Islander" |
| Cairns, Queensland, Australia | "Green Island Express" |
| Port Douglas, Queensland, Australia | "Quicksilver" |
| South Molle Island, Queensland, Australia | "Telford Reef" |
| Guangzhou, China | "Liuhua Hu" |

## UNDER CONSTRUCTION — OCTOBER 1982

| | |
|---|---|
| Hobart, Tasmania, Australia | 29m. Tourist Vessel |
| | 20m. Vessel |
| North Queensland Engineers & Agents, Cairns, Queensland | 22m. Vessel |
| Hong Kong | 21m. Vessel |
| Singapore | 29m. Crew Boat |
| | 29m. Crew Boat |
| New Zealand | 20m. Vessel |

Agents Stamp:

# INTERNATIONAL CATAMARANS

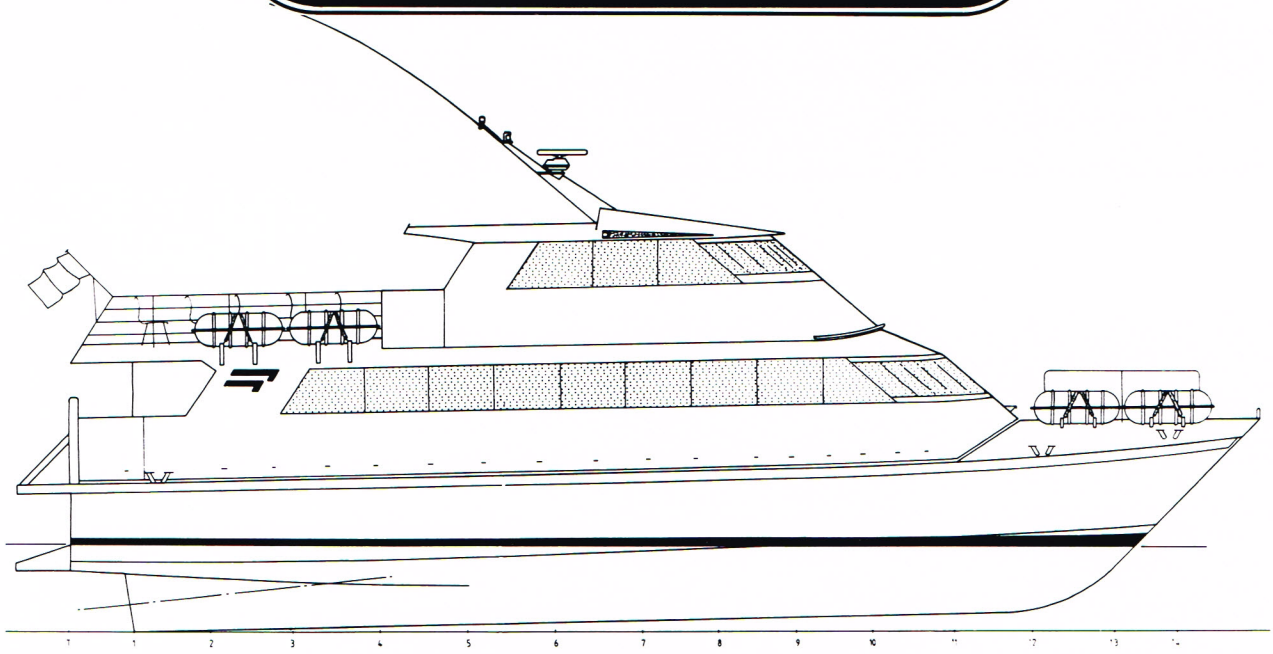
## Specification Sheet

OCTOBER 1982


22 METRE CATAMARAN

# "TELFORD REEF"

# "TELFORD REEF"



The second 22 metre catamaran built under licence by —
North Queensland Engineers & Agents Pty. Ltd.
Buchan Street, Cairns, North Queensland, Australia.

Constructed for:

TELFORD SOUTH MOLLE ISLANDS PTY. LTD.

Service:

WHITSUNDAY ISLAND GROUP, NORTH QUEENSLAND

## SPECIFICATIONS:

| | |
|---|---|
| Length o.a. | 23.0m |
| Length hull | 21.8m |
| Length water line | 19.5m |
| Beam (excluding fenders) | 8.7m |
| Beam (hull only) | 2.5m |
| Draft loaded (max.) | 1.7m |

Hull all welded aluminium
Superstructure aluminium — resiliently mounted to minimise noise and vibration

| | |
|---|---|
| Survey — | Marine Board of Queensland |
| | Partially Smooth Water (Class 1D) — 210 passengers |
| | Restricted Offshore (Class 1C) — 150 passengers |
| Seats — | Internal — Fully upholstered individual armchairs |
| | External — Moulded Polypropylene shells |
| Electronics — | Radar — JRC 302 (24 mile range) |
| | Auto Pilot — Wagner Mark 4 |
| | Depth Sounder — Royal RFA 40 |
| | SSB Radio — Codan 8121 |
| | VHF Radio — Dancom RT408 |
| Main Engines — | 2 GM12VTA with Nico MGN 80 Reverse/Reduction Gear Box 1.97 : 1 |
| Power — | 2 x 800 SHP |
| Shafts — | S.S. 316 in Cutless Bearings |
| Propellers — | 5 blade aluminium bronze |
| Rudders — | Lifting Rudders |
| Steering Gear — | Power hydraulic |
| Electrical Supplies — | 240V AC from shore power OR |
| | 20kVA Diesel alternator set |
| | 24V DC |
| Speed: | Trials — 29 knots; Cruising — 25 knots loaded. |

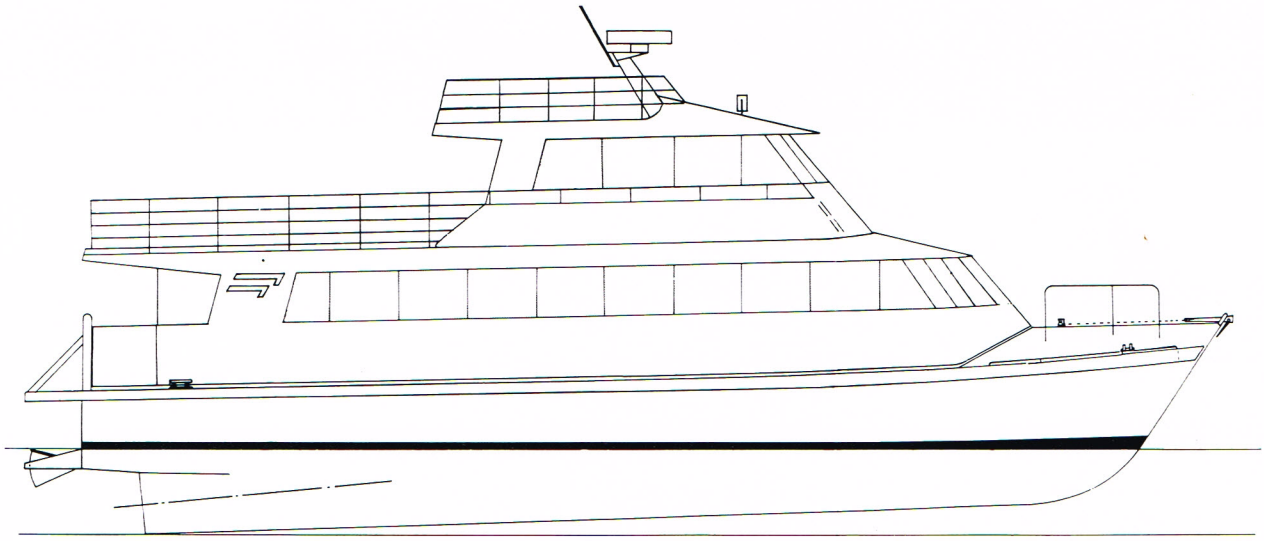
# INTERNATIONAL CATAMARANS
## Specification Sheet

OCTOBER 1982


20 METRE CATAMARAN

# "QUICKSILVER"

# "QUICKSILVER"



The fourth 20 metre tourist catamaran, built in Hobart, Tasmania in 1982.

Constructed for:

BURSILL BIRCHGROVE PTY. LTD.

Service:

TOURIST FERRY FROM PORT DOUGLAS TO ST. CRISPINS REEF, NORTH QUEENSLAND.
OPERATED BY JIM AND JO WALLACE

## SPECIFICATIONS:

| | |
|---|---|
| Length o.a. | 20.5m |
| Length hull | 19.94m |
| Length water line | 18.5m |
| Beam (excluding fenders) | 8.2m |
| Beam (hull only) | 2.3m |
| Draft loaded (max.) | 1.5m |

Hull all welded aluminium
Superstructure aluminium — resiliently mounted to minimise noise and vibration

| | |
|---|---|
| Survey — | Marine Board of Queensland<br>Restricted Offshore (Class 1C) — 100 passengers |
| Seats — | Internal — Individual armchairs<br>External — Moulded Polypropylene shells |
| Electronics — | Radar — Koden MDC — 407 (64 mile range)<br>Auto Pilot — Benmar 21<br>Sonar — Wesmar SS 116<br>SSB Radio — Codan 8121 |
| Main Engines — | G.E.C. 2 — Baudouin 12 F 11 SRM with Baudouin IRI<br>Reverse/Reduction Gear Box 3.1 : 1 |
| Power — | 2 x 550 SHP |
| Shafts — | S.S. 316 in Cutless Bearings |
| Propellers — | 5 blade aluminium bronze |
| Rudders — | Lifting Rudders |
| Steering Gear — | Power hydraulic |
| Electrical Supplies — | 240V AC from shore power OR<br>20kVA Diesel alternator set<br>24V DC |
| Speed: | Trials — 28 knots; Cruising — 24 knots loaded. |

SEPTEMBER 1981

# Going Places


# FAST

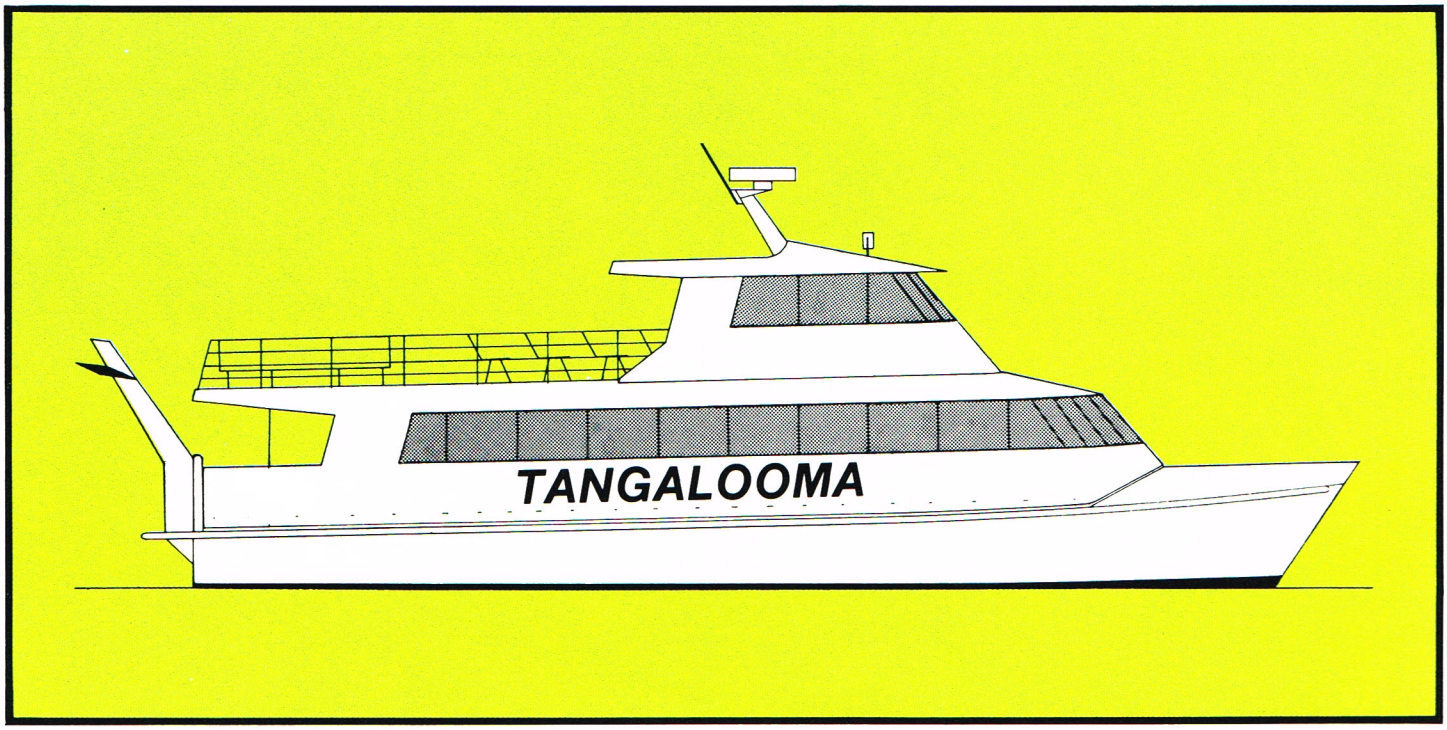
INTERNATIONAL
CATAMARANS
NEWSLETTER

**FRONT COVER PHOTO**

M.V. "Fitzroy" on her first sea trial, June 1981.
This 20 m. vessel entered service as a passenger cruise ferry between Cairns and Fitzroy Island, off the Queensland coast, in July 1981. Designed to carry 170 passengers in partially smooth water, and 100 passengers in off shore operations. Two G.M. diesels of 500 H.P. drive "Fitzroy" at a service speed of 24 knots loaded. (Trials speed 28 knots).

# Under Construction — Hobart Tasmania

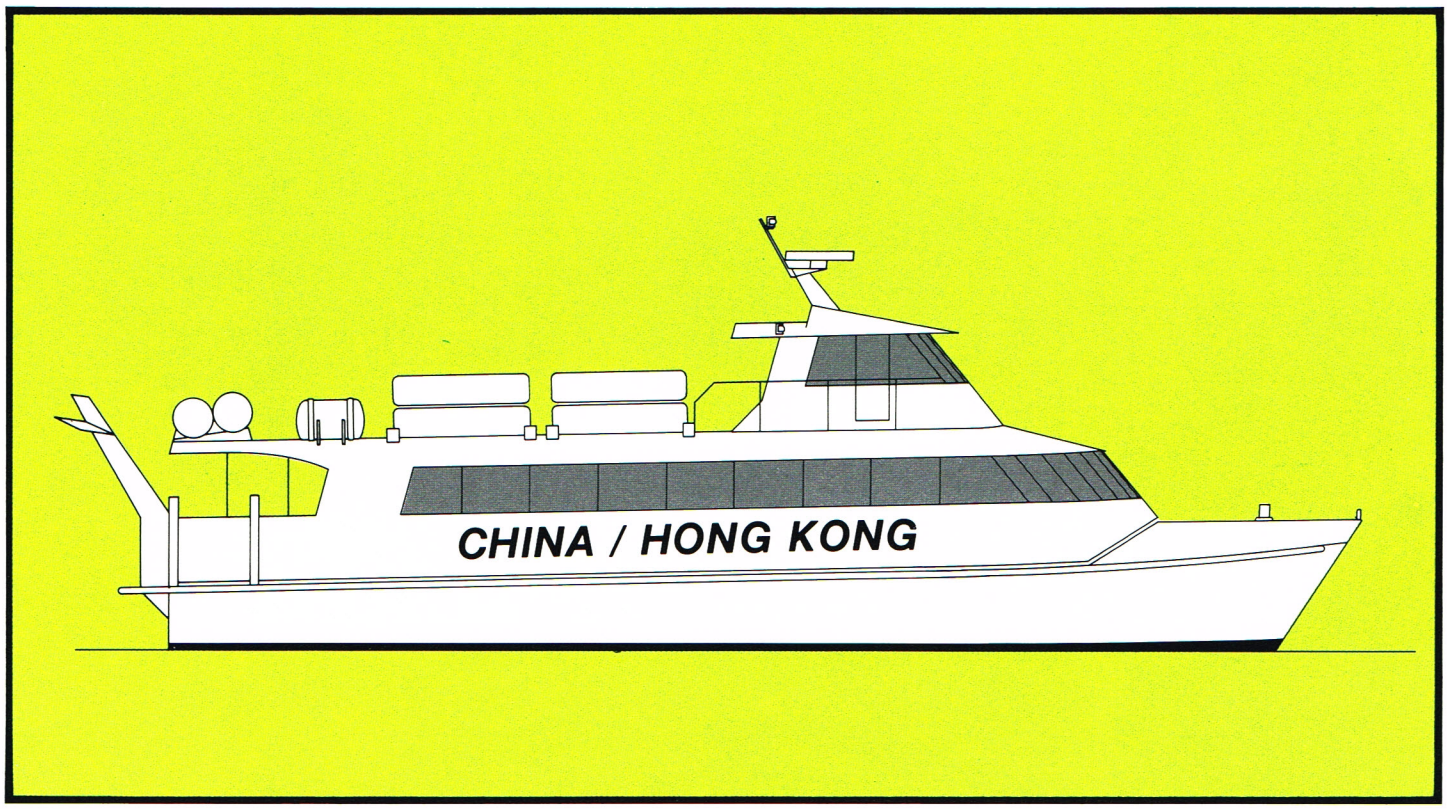
A sister ship to the M.V. "Fitzroy" is to be launched in December 1981, for service between Tangalooma and Brisbane, Queensland.
"Tangalooma" will carry up to 170 passengers in quiet luxury.
Two further sister ships have been ordered for delivery to Queensland operators.




Also for delivery in December 1981, the M.V. "Amaroo".
A shallow draft inland waters vessel, designed to operate at Forster, N.S.W. Surveyed for 120 passengers, this 15 metre vessel is of welded aluminium construction as are all vessels presently under construction in Hobart and Hong Kong.

# Catamarans in service

Hobart, Tasmania, Australia .....(Prototype)
Strahan, Tasmania, Australia .....'James Kelly"
Bay of Islands, New Zealand....."Tiger Lily II"
Auckland, New Zealand ....."Tiger Lily"
Cairns, Queensland, Australia ....."Fitzroy"
*Brisbane, Queensland, Australia ....."Tangalooma"
*Forster, New South Wales, Australia "Amaroo"
*Hong Kong/Canton, China ....."Un-named"
*Hong Kong/Canton, China ....."Un-named"
*After delivery late 1981



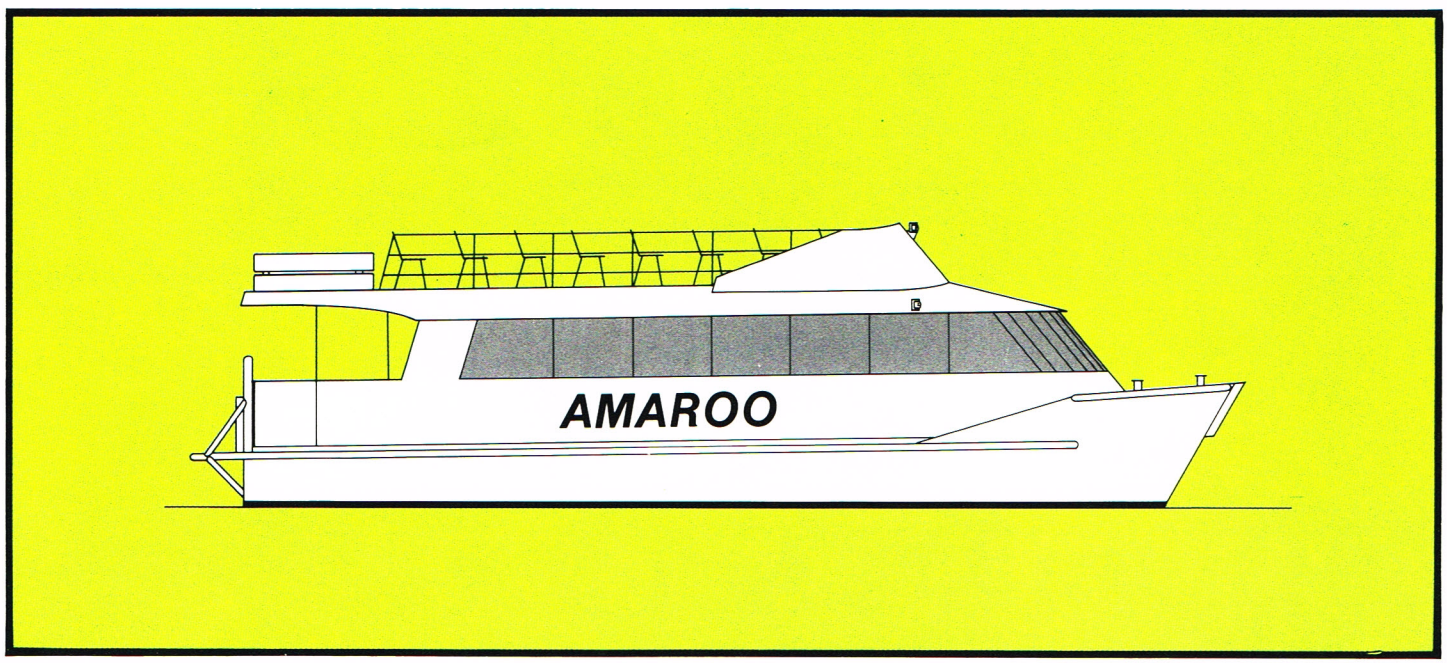

# Under construction — Hong Kong

Two vessels, currently under construction, are being built for the Peoples Republic of China. The first, 21 metre vessel, is scheduled to be launched in October 1981, with the second scheduled for December.

These vessels, capable of 25 knots service speed in shallow water, will carry 150 passengers and 5 tonnes of baggage on a 90 mile international journey between Hong Kong and mainland China.

---

Other designs available as diving charter boats, crew boats, fire boats, fishing vessels, pleasure craft, etc.



# State of the Art — New Rudder Development

Continuing our pursuit of higher speeds with lower horsepower we introduce our unique lift rudder system (patent applied for). This development helps us achieve remarkable fuel economy. Regular rudders cause drag, even when a vessel is steaming on a straight course. Our lift rudders cause no drag in straight line operation. **Rudders are lowered into the water flow only as required.**


**Tiger Lily II**

Tiger Lily II is the second of our vessels built for the Mount Cook Line, constructed in Whangarei, New Zealand. The hulls are light weight steel, and the superstructure is aluminium. Twin 8V92T G.M.'s power Tiger Lily II.


**INTERNATIONAL CATAMARANS PTY. LTD.**

Offices: Hobart — Robert Clifford
1 Secheron Road, Battery Point, Tasmania, 7000.
Phone: (002) 34 3296, 34 8021

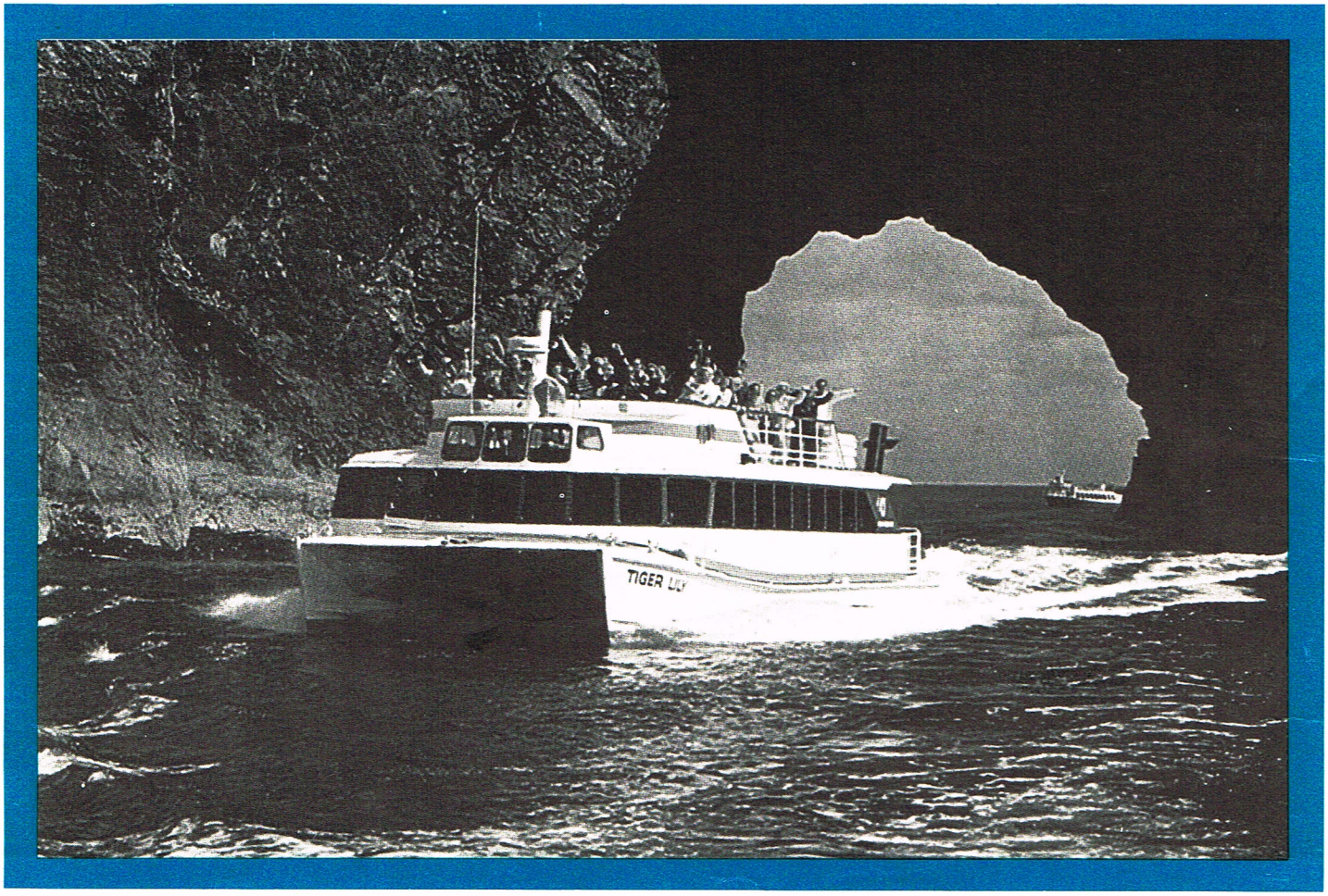
Sydney — Philip Hercus
4 Help Street, Chatswood, N.S.W., 2067
Phone: (02) 411 1725, 411 5316

Licencees: Hong Kong —
Satis Consultancy Services Ltd., 861 Laichikok Rd., Kowloon.
Phone: (3) 741 0981

New Zealand —
International Catamarans (Pacific) Ltd., 5 Orchard Place, Whangarei
Phone: (89) 84204, 87813

# INTERNATIONAL CATAMARANS NEWSLETTER

DECEMBER 1980




Tiger Lily, the first Mount Cook Line catamaran speeds "through the hole" in Piercy Island, a rocky outcrop off Cape Brett at the eastern entrance to the Bay of Islands, N.Z.


## International Catamarans Pty. Ltd.

HOBART: Robert Clifford
1 Secheron Road,
Battery Point, Hobart
Tasmania, Australia.
Telephone: (002) 343296

SYDNEY: Philip Hercus
5 Bryson Street,
Chatswood, Sydney
N.S.W., Australia.
Phone: (02) 411 1725

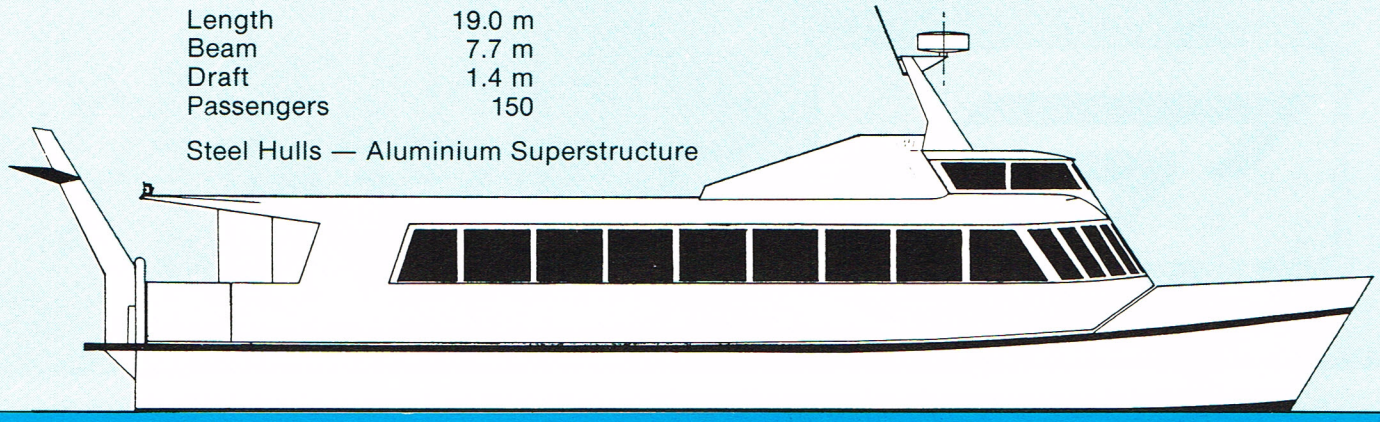
## International Catamarans (Pacific) Ltd.

NEW ZEALAND: Bruce J. Lovie
Riverside Drive, P.O. Box 1045, Whangarei
Business (89) 84-202
Private (89) 87-813

The Mount Cook Line have ordered a sister ship, "Tiger Lily II" to be delivered in January, 1981.

| | |
|---|---|
| Length | 19.0 m |
| Beam | 7.7 m |
| Draft | 1.4 m |
| Passengers | 150 |

Steel Hulls — Aluminium Superstructure



## *STATE OF THE ART*

*Moving into the future meeting the challenge of an energy conscious world.*

*Technology combining the performance of sophisticated craft with economics and reliability of conventional craft.*

*At the frontiers of technology solutions have been found and proven for problems encountered.*

*New insights to propeller design have provided higher efficiencies leading to greater fuel economies*

*Further development to our "magic carpet suspension" and refinements in design have made the quiet catamaran quieter.*

*Others follow our lead.*

Under construction in our Hobart yard, an all aluminium catamaran destined for Fitzroy Island.

| | |
|---|---|
| Length | 20.0 m |
| Beam | 8.2 m |
| Draft | 1.5 m |
| Passengers | 150-200 |