Report on the investigation of three persons falling overboard from a rigid inflatable boat in the River Test during the Southampton International Boat Show on 22 September 2000 with one fatality

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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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GLOSSARY

EU	-	European Union
GRP	-	glass reinforced plastic
hp	-	horse power
kg	-	kilogram
kW	-	kilowatt
lb	-	pound
m	-	metre
MCA	-	Maritime and Coastguard Agency
mm	-	millimetre
mph	-	miles per hour
N	-	Newton
RIB	-	rigid inflatable boat
RINA	-	Registro Italiano Navale
RNLI	-	Royal National Lifeboat Institution
rpm	-	revolutions per minute
VHF	-	Very high frequency (radio)
The Directive	-	EU Recreational Craft Directive 94/25/EC

SYNOPSIS

At about 1300 on 22 September 2000, three people boarded a rigid inflatable boat (RIB) from a Sowester Simpson-Lawrence berth at the Southampton International Boat Show marina. The RIB was 5.4m long and was fitted with a 55kW (75hp) outboard engine. One of the three was a dealer invited to work on the marina, the other two were his acquaintances. The dealer was very experienced in the use of fast craft but had no formal qualification in their use, although none was required.

The dealer manoeuvred clear of the marina and headed for a designated demonstration area in the River Test off Marchwood. There he took the craft on several circuits of various speeds, up to about 35 knots. He was unaware of the harbourmaster's 15 knot speed limit in this area.

One of the group, inexperienced in using fast craft, asked if she could take the controls. The dealer agreed, and he stopped the RIB in the centre of the demonstration area for the handover. They exchanged places, the throttle was fully opened, and the wheel was turned to port. The craft accelerated, turned to port and then sharply to starboard, throwing all three occupants overboard.

The engine's kill-cord, part of the engine's safety cut-out system, had not been attached during the handover, and the RIB ran away out of control, circling clockwise. A second craft arrived and managed to recover two people from the water. Before it was able to recover the third person, it was hit by the runaway RIB. The RIB then resumed circling before running over the third person.

He was recovered into the second craft and appeared to be badly injured. While returning to the boat show marina at high speed, the coxswain of the craft contacted the organisers, and requested medical assistance. On arrival at the marina there was some difficulty finding a vacant berth at which to land the casualties. The injured person was later pronounced dead.

The accident was caused by an inexperienced person losing control of the craft at a large throttle opening. Had the engine's kill-cord been properly attached the consequences might not have been serious. Contributory factors were: users of the RIB were not aware of important safety information; the RIB's owners had no clear policy to ensure its safe operation.

This report makes a number of recommendations to improve safety during future Southampton International Boat Shows. These can be seen in Section 4 - Recommendations.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF VESSEL AND ACCIDENT

Name	:	No name
Port of registration	:	Unregistered
Type	:	Pleasure vessel
Construction	:	Rigid inflatable
Length	:	5.4m
Date built	:	2000
Loaded displacement	:	1.31 tonnes
Manufacturer	:	Arimar SRL Via Beneficio II Tronca 57/A 48015 Montaletto di Cervia RA Italy
Owner	:	Sowester Simpson-Lawrence Ltd Stinsford Road Nuffield Industrial Estate Poole Dorset BH17 0SW
Engine	:	Mercury outboard
Fuel	:	Petrol
Output	:	55kW (75 hp)
Maximum engine revolutions	:	6000rpm
Gears	:	Forward - Neutral - Reverse
Gearbox ratio	:	2.07:1
Place of accident	:	River Test, Southampton
Time and date	:	Shortly after 1300 on 22 September 2000
Injuries	:	One fatality

1.2 NARRATIVE
All times are BST (UTC + 1 hour)

At about 1130 on 22 September 2000, the Arimar 540 rigid inflatable boat (RIB), from a Sowester Simpson-Lawrence berth at the Southampton International Boat Show, was taken for a demonstration in the River Test by one of the company's managers.

On returning to the boat show marina the manager remained with the craft until about 1300. At that time a dealer arrived at the craft with two acquaintances, a male and a female, indicating he wished to use the RIB.

The dealer and his acquaintances donned buoyancy aids and boarded the RIB. The dealer manoeuvred it clear of the berth and clipped the cord of the engine safety stop switch, the kill-cord, to his lifejacket. He headed the craft at low speed towards the Marchwood demonstration area in the River Test.

On arrival at the demonstration area, about half a mile from the marina, he took the craft on several circuits of various speeds. He also made at least one standing start by rapidly accelerating the craft to speed from rest.

Meanwhile a second RIB from the boat show marina arrived in the demonstration area, and those on board noticed the Arimar RIB making fast turns.

The dealer on board the Arimar RIB stopped the craft in the centre of the demonstration area, to exchange places with the female. Before moving places, he unclipped the kill-cord from his lifejacket, but the female did not connect it to herself. The dealer sat to the female's left, and the second male moved to the forward part of the craft.

The female opened the throttle fully, and the craft turned to port as if to begin an 's' turn to join the clockwise circulating traffic. The craft then took a sharp turn to starboard and almost stopped, throwing its occupants into the water. It then ran out of control and began circling close to the people in the water.

The occupants of the second RIB, having seen the three people in the water, stopped their RIB nearby. They managed to recover two people who were to port of the RIB. One person remained in the water, to starboard of the RIB.

Meanwhile, the Arimar RIB was still circling out of control. Shortly after the recovery of the first two people, the Arimar RIB hit the second RIB, rode up its buoyancy tube and hit its 'A' frame, before sliding off and into the water.

The Arimar RIB resumed circling, but about a different centre.

The person remaining in the water was being urged to swim towards the second RIB. Before he was able to move far, the circling Arimar RIB appeared to pass close to him and he called out that he had been hit. What appeared to be blood was then seen on the water nearby.

The second RIB manoeuvred the short distance towards him and he was lifted on board. He appeared to be injured. While heading for the marina at high speed, the helmsman used his mobile telephone to contact boat show staff to arrange for an ambulance and medical assistance to be ready for the casualty's arrival.

On approaching the marina, a little more than a minute later, he attempted to manoeuvre towards its north-western corner. There was no vacant berth, and other craft in the area impeded his access.

When a berth was found, the casualty was given some medical aid and was transferred to hospital by ambulance. There he was pronounced dead.

Meanwhile a harbourmaster's launch arrived at the demonstration area at about 1315. This, and another RIB from the boat show, attempted to manoeuvre alongside the runaway RIB to pull back the throttle lever and bring it under control.

Both were unsuccessful.

With the intention of fouling the propeller of the runaway RIB, and stalling its engine, the harbourmaster's boatman prepared a length of rope. The Calshot RNLI inshore lifeboat arrived shortly after 1330. Before the rope was deployed, the lifeboat rammed the runaway RIB and one of its crew jumped aboard.

Contact between the two craft caused the runaway RIB to be deflected from its circling pattern. It then travelled about 100m north, towards the main channel, before the lifeboatman was able to bring it under control.

Having brought the RIB under control, the lifeboatman handed it to the crew of another boat operating from the marina, who returned it to the marina.

Once there, the lifeboatman demonstrated how he had found the throttle setting. The functioning of the kill-cord switch was also tested, and was found to be satisfactory. The RIB was later lifted from the water and placed on the quay to the west of the marina.

1.3 WEATHER CONDITIONS

During the afternoon of 22 September 2000, the conditions on the River Test, Southampton were good. It was sunny, dry, calm and the visibility was good.

1.4 GENERAL ARRANGEMENT OF THE ARIMAR RIB (Figure 1)

The Arimar RIB is a rigid inflatable boat, with a glass reinforced plastic (GRP) 'vee' hull with a five compartment pneumatic buoyancy tube all around, bar the stern.

Amidships is a control console with steering wheel, engine/gearbox controls, instruments and light switches. A metal grab rail, which passes over the top of the console, is secured on either side. A grab handle is at the left of the console, into which is built a small locker.

Just aft of this is a transverse bench seat for the helmsman and one other. The cushion is level with the top of the buoyancy tubes. Under the seat's cushion is a large locker space for loose gear. It also houses the battery and electric bilge pump.

Behind this seat is an 'A' frame carrying the navigation lights. This is fitted just forward of the transom on which is mounted the outboard engine, a 55kW (75hp) Mercury 4-stroke.

Integral with the forward part of the control console is a small seat. In the bows is another seating area, with a second large locker space for loose gear underneath it.

Twelve grab handles are distributed around the buoyancy tube, six each side. One-metre lengths of lifelines are also attached to the top of each tube forward.

Figure 1

1.5 REQUIREMENTS AND REGULATIONS

Notice to Mariners

Southampton harbourmaster issued Notice to Mariners No 16(T) of 2000 on 30 June 2000 **(Annex 1)**. This gave notice of the construction of the marina complex at the site of the Southampton International Boat Show, and set out requirements for navigation of vessels and craft using it.

In particular, the Notice defined two demonstration areas for the use of craft wishing to exceed a speed of 6 knots. These areas are described, and shown, on chartlets attached to the Notice.

Merchant Shipping Regulations

Few Merchant Shipping Regulations apply to pleasure craft within the area controlled by Southampton harbourmaster. Most are contained in the Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations, which give effect to the International Regulations for Preventing Collisions at Sea, 1972, as amended.

These regulations require a craft the size and speed of the Arimar 5.4m RIB to be fitted with specified navigation lights if used between sunset and sunrise. These are: an all-around white light and sidelights.

European requirements

The Recreational Craft Directive 94/25/EC (the Directive), was adopted by the European Parliament on 16 June 1994. It became UK law by the Recreational Craft Regulations 1996 (SI 1996/1353), which came into force on 16 June 1996. The regulations had a transition period until 16 June 1998, when they became mandatory.

The Directive and Regulations apply to recreational craft with hull lengths measuring between 2.5m and 24m, regardless of means of propulsion, intended for sport or leisure purposes.

Certain craft are excluded from the scope of the Directive. These include: those used for racing; canoes; replicas of historical craft; experimental craft; surfboards; submersibles; hydrofoils; air cushion vehicles; craft specifically intended to be crewed to carry passengers for commercial purposes.

The approval requirements of the Directive were applied to the Arimar RIB involved in this accident.

The Directive requires the manufacturer to perform tests and calculations, or have these carried out by a notified body on behalf of the manufacturers. Certain marks must then be affixed to the craft to show compliance with the Directive.

The marks on the hull must show:

- manufacturer's code,
- country of manufacture,
- unique serial number,
- year of production,
- model year.

A separate marking is to show:

- manufacturer's name,
- ʁ⌊ marking,
- boat design category,
- manufacturer's recommended load,
- number of persons recommended by the manufacturer for which the boat was designed to carry when underway.

The manufacturers of the Arimar RIB selected Registro Italiano Navale (RINA), the Italian classification society, to act as their notified body. Following tests and inspections, RINA issued a certificate of compliance for the 5.4m Arimar RIB on 11 May 1998. RINA is included in the list of bodies able to undertake procedures required by the Directive.

Engine

The only explicit mention of outboard engines in the Directive requires that all boats with outboard engines shall have a device to prevent starting the engine in gear. The exception to this is for engines either producing less than 500N of thrust, or those which have their thrust limited to 500N at the time of starting.

Handling characteristics

The Directive requires the manufacturer to ensure that the handling characteristics of the craft are satisfactory, using the most powerful engine for which the boat is designed and constructed.

Approval under the Directive

RINA's report of survey states that the type of engine fitted at the time of the test was an 88kW outboard petrol engine. No other engine characteristics are mentioned.

It further states that handling characteristics have been ascertained according to the design category and the manufacturer's recommended maximum power and load.

Crew

Only two people, of the three in the boat at the time of the accident, had control at any stage after it left the marina.

The boat left the marina under the control of one of Sowester's dealers. Although very experienced in the use of fast craft, he had no formal qualifications in their handling.

After the boat had reached the demonstration area and completed a few circuits, the man "driving" it handed control to a second person. She had limited experience and knowledge of handling fast craft.

When the Arimar RIB operates as a pleasure craft, there is no statutory requirement for the crew to be qualified in any aspect of boat handling or navigation.

1.6 BOAT DESIGN CATEGORIES

The Directive defines four sea areas of intended operation. These are categorised as follows:

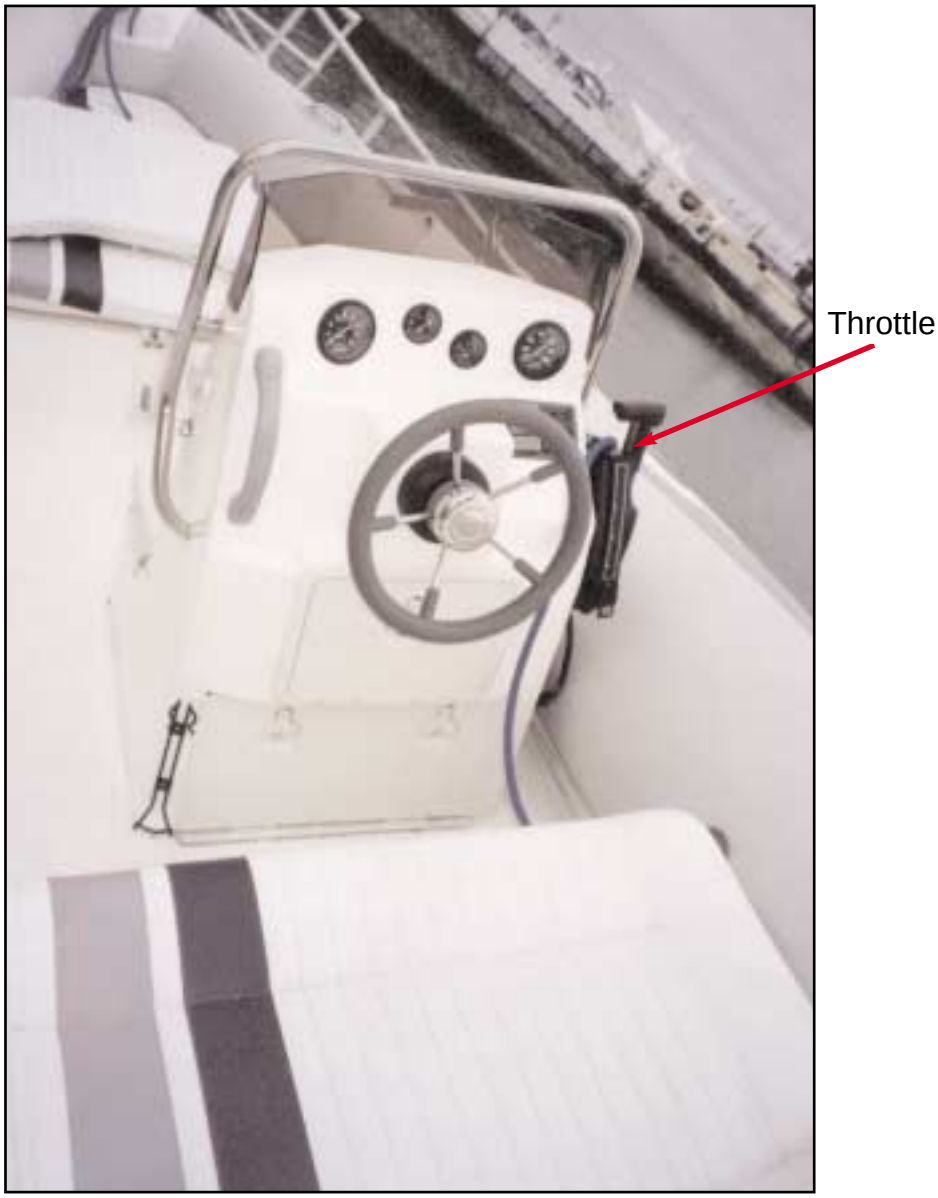
A - ocean
B - offshore
C - inshore
D - sheltered waters.

Category B, the category for which the Arimar RIB has approval, specifies limiting conditions of wind force 8 and significant wave heights up to, and including, 4m.

1.7 INSPECTION OF CRAFT AFTER RECOVERY

A brief initial inspection of the RIB was made after its recovery from the water to a quay, adjacent to the Southampton International Boat Show site, on the afternoon of the accident **(Figures 1 and 2)**. The engine had already been fully tilted, and both the engine's kill-cord and ignition key had been removed. The engine/gearbox control lever was in the position corresponding to full ahead. No major hull damage was found at that time, but some damage was noticed on the tips of the propeller. A painter/bowline was secured forward.

Figure 2



Following the boat's transfer to a storage facility it was inspected in greater detail on 3 October 2000.

Labels attached to the boat have the following marks:

Design category B
Max persons 9 (nine)
Gross load 910kg
C⌊
IT-ARI 51724F
0 01

Minor damage, scuff marking and scratching was found on the starboard bow. All inflatable buoyancy tubes were intact and fully inflated.

The forward locker compartment contained the following:

One lifejacket
Rescue line
Two x 22 litre petrol containers
Anchor and cable
Paddles
Two fenders
Air bellows
Fire extinguisher (from clip by steering console)

The aft locker compartment, beneath the helmsman's seat, contained the following:

Two empty petrol containers
Battery
Electric bilge pump
Two fenders
One flag

The locker set in the steering console contained two smoke floats. The fuel tank is enclosed in the lower part of this console, underneath the locker.

A label is attached to the engine:

DT 152408
75ELPT
Max rpm 6000
hp 75 kW 56
lb 390 kg 177
ʁ⌊ 00

The propeller fitted was of 15" (380mm) pitch, 3 blade, right hand rotating.

In addition to the propeller-tip damage recorded at the earlier inspection, it was noted that the engine's torque tab (see Section 2.9) was offset about 10° from straight-ahead, with its leading edge towards starboard **(Figure 3)**. The torque tab showed no signs of damage, and was securely fitted.

The engine/gearbox control box is mounted on the starboard side of the helmsman's control console. Its labelling indicates it is provided with in-gear starting protection. The control lever is fitted with an interlock, preventing movement from the neutral position unless a detent button is depressed. It is also fitted with engine trim controls.

Torque tab

Figure 3

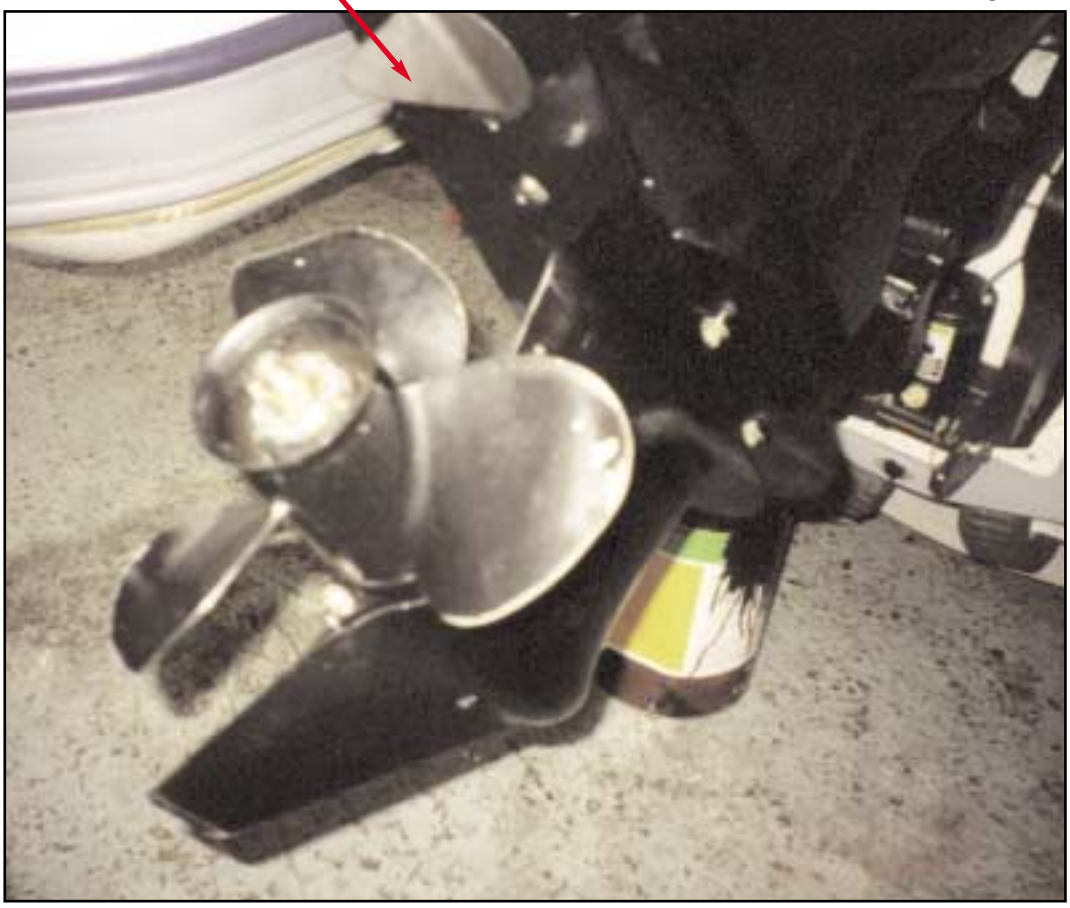
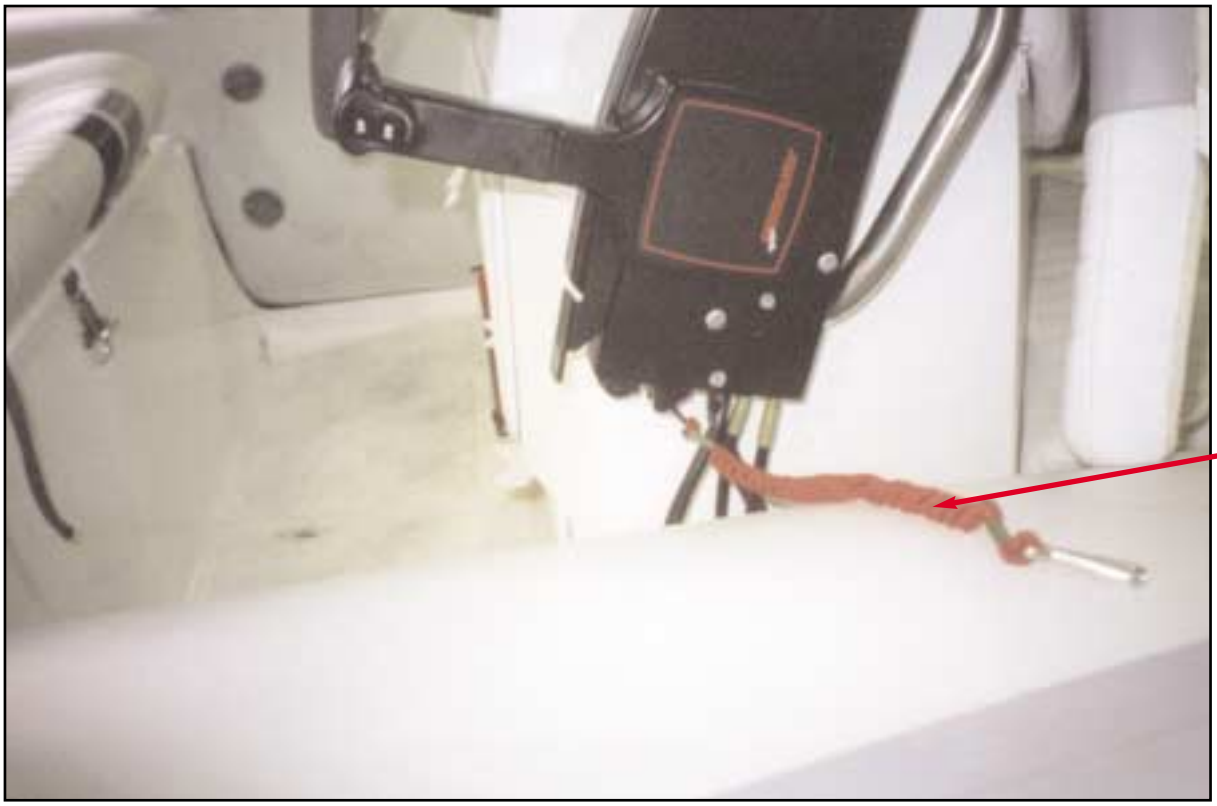


Figure 4



In addition to a key-operated ignition switch, on the lower edge of the control box there is a toggle switch which can shut off the engine **(Figure 4)**. The plastic end-loop of an elastic cord can be passed over the toggle, which then retains it in place if it is switched to the 'engine run' position. A pull on the cord causes the toggle to move to the stop position, allowing the loop to fall clear. This cord is the safety device known as the 'kill-cord'. The toggle switch can be placed in the 'engine run' position without the cord's plastic end-loop being in place.

The extended length of the kill-cord is about 1.3m. On one end is the above-mentioned loop, on the other is a clip intended for attaching the cord to the helmsman.

This kill-cord system was tested and, mechanically, found to function as intended. The switch was not tested electrically. However, it was reported to have been tested immediately after the boat returned to the boat show marina, while the boat was still waterborne.

The push-pull cable steering system is CE approved and rated up to 230hp. It was undamaged and free to move hard-over to hard-over. No significant play was found in the system. Only very small transverse forces on the engine were needed to move the steering system.

Instrumentation on the control console is:

Engine tachometer
Engine trim
Fuel
Speed (calibrated in mph, to 65mph)

Also on the console are three switches, labelled;

Lights
Bilge pump
Not labelled

On the 'A' frame at the stern are three navigation lights: an all around white light and two sidelights.

1.8 IN-WATER TESTS

Following the inspection, two sets of tests were performed in an effort to understand the craft's behaviour. The deputy training manager of the Maritime and Coastguard Agency (MCA), an officer experienced in training coastguard personnel in the use of RIBs, prepared reports on these tests.

The first tests were carried out on 10 November 2000. All tests were conducted with engine's torque tab at the 10° starboard setting found immediately following the accident. Because of the damage found on the original propeller, it was

replaced before this test. The replacement propeller had a pitch of 17”(43cm), the original was 15”(38cm). Some tests were performed, but because of the difference in propeller pitch, it was decided to repeat them with a second replacement propeller having a pitch of 15”.

The second tests were carried out on 19 January 2001.

Both tests showed that the steering attempted to turn the engine to starboard at all ahead speeds. The helm effort required to maintain a straight course increased with speed. There was no clear difference in the effect between the two propellers.

During the second tests, efforts were made to reproduce the reported behaviour of the craft at the time of the accident, albeit at reduced speed.

First the boat was stopped in the water, the helm released and full throttle then applied. Both wheel and engine went hard to starboard immediately, and the boat went into a very tight starboard turn. It inclined 15° to 20° to starboard, but there was no significant threat to the occupants.

The boat was then brought on to the plane at an indicated speed of 28 mph (45 km per hour) and began a turn to port. The wheel was then released. This resulted in a violent turn to starboard, accompanied by a rapid skid to port. The hull then gripped the water; abruptly arresting the lateral skid. The boat was thrown violently into a 15° heel to port. The helmsman temporarily lost control of the throttle and wheel.

During these tests it was noted that the feedback from the engine to the steering was excessive, which made the craft difficult to control.

1.9 SOUTHAMPTON INTERNATIONAL BOAT SHOW (Annex 2)

Mayflower Park in Southampton has been the site of Southampton International Boat Show since 1969. The show has grown in size and duration in that time. Initially, legislation prevented Mayflower Park from being closed for more than six consecutive days. The Hampshire Act 1983 made provision for this to be extended to nine days.

The show’s continued growth may be measured by the enactment in 1997 of an Act of Parliament (the Southampton International Boat Show Act 1997). This amended the Hampshire Act 1983, to allow the number of consecutive days on which Mayflower Park is closed for the purposes of the show to be increased to ten. This allows the show to cover two consecutive weekends, plus a preview day.

The show is considered to make a significant contribution to the economic prosperity and commercial reputation of the city of Southampton, and is an important event for the recreational boat trade.

Each year a temporary marina complex is constructed adjacent to Mayflower Park for the display of waterborne craft. Some are available for demonstration to potential customers.

1.10 EXHIBITORS' MANUAL

The organisers supply an Exhibitors' Manual to each exhibitor. This covers numerous details concerning the show's arrangements. One section covers health and safety matters, and offers advice on areas of risk, and undertaking a risk assessment. This section of the manual does not, however, cover any waterborne activities.

The organisers' requirements concerning waterborne operations from the show's marina are set out in the sections covering marina regulations and terms and conditions. They specifically mention general speed limits, and the location and speed limits applying in two demonstration areas. They are supplemented by a chartlet showing the location of these two areas.

These two sections also explain that the organisers will have a patrol boat monitoring waterborne activities from the marina and that all craft must carry a VHF radio.

An undated copy of a Notice to Mariners from Southampton's harbourmaster is also included. The text is not identical to the Notice No 16(T) issued by the harbourmaster in 2000 but, with their attached chartlets, on matters of speed limits and demonstration areas, the contents of the two Notices are similar.

Both Notices to Mariners remind owners, agents, charterers, marinas, yacht clubs and recreational sailing organisations, of the need to ensure that the masters, or persons in charge of their vessels or craft, are familiar with their contents.

The organisers also set out a set of marina rules and regulations in the manual. These cover all the speed limits and descriptions of the demonstration areas covered in the Notice to Mariners.

They also remind exhibitors that they are responsible for having competent seamen in charge of their craft, and for the safety of visitors on and around their boats. The organisers also reserve the right to impose a ban on waterborne demonstrations by any exhibitor who does not comply with these requirements.

Guidance for the handling of major incidents is supplied in supplementary documents. These were revised during August 2000. They contain essential telephone numbers, and the responsibilities and procedures for handling major incidents.

Three types of incidents covered are 'death, drowning or multiple casualties'. The associated guidance provides for the transfer of the injured to first-aid

points, summoning of ambulance services, their access to the site, alerting police and organisers to clear approaches for ambulances, stretchers etc.

1.11 DEMONSTRATION AREAS

North of a line between Hythe Pier and Weston Shelf buoy (including the area shown in **Annex 2**) is a general speed limit of 6 knots. For the duration of the Southampton Boat Show, any craft up to 8m long wishing to exceed this speed limit is directed to a demonstration area in the Marchwood Channel.

The boundaries of this area are defined by buoyage, and are described on the chartlet attached to the Notices to Mariners.

A second demonstration area, described in the Notices to Mariners, is for the use of craft of any length running at speed exceeding 15 knots. This area is further to the east, off Netley Shore, and is also defined by buoyage.

These demonstration areas have been in use for several years during the annual Southampton International Boat Show.

1.12 SOWESTER SIMPSON-LAWRENCE

The company can trace its roots to 1947. Since then there have been changes of name and ownership. However, its core business has remained the distribution/supply of marine equipment, outboard/inboard engines, inflatable craft, engine control/steering systems and, more recently, personal watercraft. It has also distributed Mercury outboard engines since 1961 and Morse Control/Steering Systems since 1960.

It sells nothing directly to the general public. All business is undertaken through approved dealerships distributed around the UK. Each one is independent of Sowester Simpson-Lawrence, although they clearly have a close business relationship.

The company has been exhibiting at the Southampton Boat Show since 1969, and has been demonstrating craft from the marina for many years as well as having a land-based exhibit.

This company was a stand holder at the Southampton International Boat Show 2000. It also hired marina berths to display and demonstrate boats, one of which was the Arimar RIB.

SECTION 2 - ANALYSIS

2.1 STATUS OF CRAFT

In the Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) Regulations 1988 the definition of a “pleasure vessel” states:

Any vessel which at the time it is being used is:

In the case of a vessel owned by a body corporate, used only for sport or pleasure and on which persons on board are employees or officers of the body corporate, or their immediate family or friends; and

On a voyage or excursion which is one for which the owner does not receive money for or in connection with operating the vessel or carrying any person, other than as a contribution to the direct expenses of the operation of the vessel incurred during the voyage or excursion.

It is considered that the Arimar RIB was being used in such a way as to comply with this definition of a pleasure vessel.

The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 might have applied to this craft if any person on board had been classified as a worker. The status of the three people on board the Arimar RIB, at the time of the accident, has not been established beyond doubt. However, in view of the above definition, for the purposes of this investigation this craft is considered a pleasure vessel and these regulations do not apply.

The MCA views this craft as having the status of a ‘pleasure vessel’, in common with most vessels operating from the Southampton Boat Show marina.

Details of the vessel’s design, such as the helmsman’s bench seating, instead of astride seating, and the lack of toe straps, suggest it is intended for family/recreational use, rather than extreme speed or commercial use.

As a pleasure vessel, the Arimar RIB was required to comply with no Merchant Shipping construction requirements other than the requirement for navigation lights as contained in The Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations. It complied with these requirements.

2.2 COMPLIANCE WITH THE EU RECREATIONAL CRAFT DIRECTIVE

The RIB’s hull, construction and labelling appear to comply with the Directive.

Only two points concerning the engine are covered in the Directive, and one is covered only indirectly by ‘handling characteristics’. The other, that in-gear starting is prevented, appears to be satisfied by the Mercury 75 engine and its controls.

Although the notified body, RINA, declared compliance with the handling characteristics requirement, this declaration has some limitations. Firstly, no limit is placed on the weight of the engine used. Secondly, the handling tests were performed with the boat manufacturer's maximum load on board.

Variations in either, or both, of these factors could have a significant effect on the boat's behaviour; effects which cannot be predicted with any certainty. They can only be reliably established by in-water trials.

Without knowing the weight of engine used in these handling tests, no customers would be able to replicate the handling, even if they complied with the engine power limitations. Also, it is unlikely that the RIB would be fully loaded with nine people very often. The type-approval handling trials may thus give an unrepresentative indication of a boat's handling in the hands of the end user.

As the choice of engine is left with the end user, the Directive's requirement, that handling should be satisfactory, has limitations. The responsibility for ensuring acceptable engine choice and installation is, in effect, placed on the end user. Similarly, once the engine has been selected, final trimming also needs to be done by the user.

To require every combination of boat, and engine type and model to be approved would require a change in the Directive. But to do so would probably place an unacceptable burden on the industry and customer. Little advantage is seen in recommending such a change.

2.3 STATUTORY CONTROL

Although it did not involve fare-paying members of the general public, this accident is seen as being associated with Southampton International Boat Show. Its organisers will, therefore, need to be sensitive to the public's reaction to the tragedy.

All exhibitors have a major interest in showing their wares and organisations in the best possible light to potential customers. It is not in their business interests to operate, or be seen to operate, in an unsafe manner. Experienced in boat operations, some customers and visitors would quickly identify unsafe operations, which would, in turn, generate unfavourable impressions.

It is in the interests of all exhibitors to be seen to operate in a safe and professional way. The commercial disadvantage from not doing so would probably be far greater than any financial penalties that a statutory system of control could inflict.

There is seen to be little merit in attempting to impose a greater level of statutory regulation on these activities. Such regulation would be difficult to introduce without bringing all pleasure craft activities under its umbrella. This is likely to

prove unwieldy, difficult to police, fall into disrepute and be ignored. The aim of improving safety would be defeated.

To improve safety at the Southampton Boat Show, there are areas where the safety management of some fast craft demonstrations could be improved. As owners of the craft involved, the exhibitors should address these concerns.

2.4 SAFETY MANAGEMENT

Several exhibitors using demonstration RIBs at Southampton International Boat Show clearly made efforts to apply minimum safety standards.

Some gave potential customers safety briefings, emphasising that the demonstrator alone was to have control of the craft. Others, however, were less rigid in their briefing and safety policy.

Sowester Simpson-Lawrence dealers were allowed to use the company's demonstration craft. However, they had been given no instructions to give potential customers a safety briefing, or stress that customers were not allowed to take control. Usually the practice of not allowing customers to take control was at the initiative of individual dealers/demonstrators.

Dealers manned the Sowester Simpson-Lawrence stand at the invitation of the company. Provided Sowester Simpson-Lawrence considered the background and experience of a dealer suitable, he or she was allowed to use these craft. Although some dealers were manning the marina ostensibly as the representatives of Sowester Simpson-Lawrence, details of the safety policy or safety related documents with respect to demonstration craft were not passed to them. In particular, basic safety information such as speed, limits and positions of demonstration areas, contained in the Exhibitors' Manual, should have been the minimum data passed to them.

The boat show organisers require that exhibitors comply with all laws, including health and safety. Sowester Simpson-Lawrence did not pass all safety-related information to demonstrators, including the legally-binding requirements of the harbourmaster, such as the Notice to Mariners (**Annex 1**). The more general non-compliance with speed limits in the demonstration area shows that the owners of other demonstration craft might also have failed in this respect.

Although this accident did not happen while the RIB was being demonstrated to a potential customer, it is clearly important that all users of boats at a venue open to the general public, have knowledge of important safety information. Exhibitors are recommended to pass essential safety information to all staff involved with waterborne activities.

2.5 SPEED LIMITS

After arriving in the demonstration area, the Arimar RIB was driven at full throttle for several circuits. Its likely maximum speed was about 35 knots; well in excess of the speed limit.

The speed limit inside the demonstration area off Marchwood was 15 knots for the duration of the boatshow. The coxswain of the Arimar RIB observed other craft in the area travelling at similar speeds to his own. It is apparent that many users of this area either ignored, or were not aware of the speed limit. It is not known whether all the craft seen exceeding the speed limit were operating from the boat show marina. However, it is apparent that general knowledge of the speed limit was very limited. Also, the monitoring and policing of this demonstration area was ineffective.

The demonstration area off Weston Shore, intended for speeds over 15 knots and for craft over 8m, can be seen from the harbour control tower. Activity in this area can be monitored quite effectively. However, the demonstration area off Marchwood relies on waterborne policing. If the Southampton harbourmaster, in consultation with the organisers, considers this speed limit is still valid, he should take steps to ensure compliance. He is recommended to take this action.

In-water tests showed that the events of the accident were almost reproduced at 28 mph (45 km per hour), a speed much less than that corresponding to full throttle. Had its throttle been set to a position corresponding to the speed limit in the demonstration area of no greater than 15 knots, this accident probably would not have occurred.

2.6 HANDLING OF THE ARIMAR RIB

The flow of water around a boat's propeller, and the system of forces it generates, is complex. These are affected by several factors whose variation results in changes in magnitude and direction of the propeller's forces.

The most significant propeller forces, together with their likely effects on a boat's handling, are discussed below:

Torque

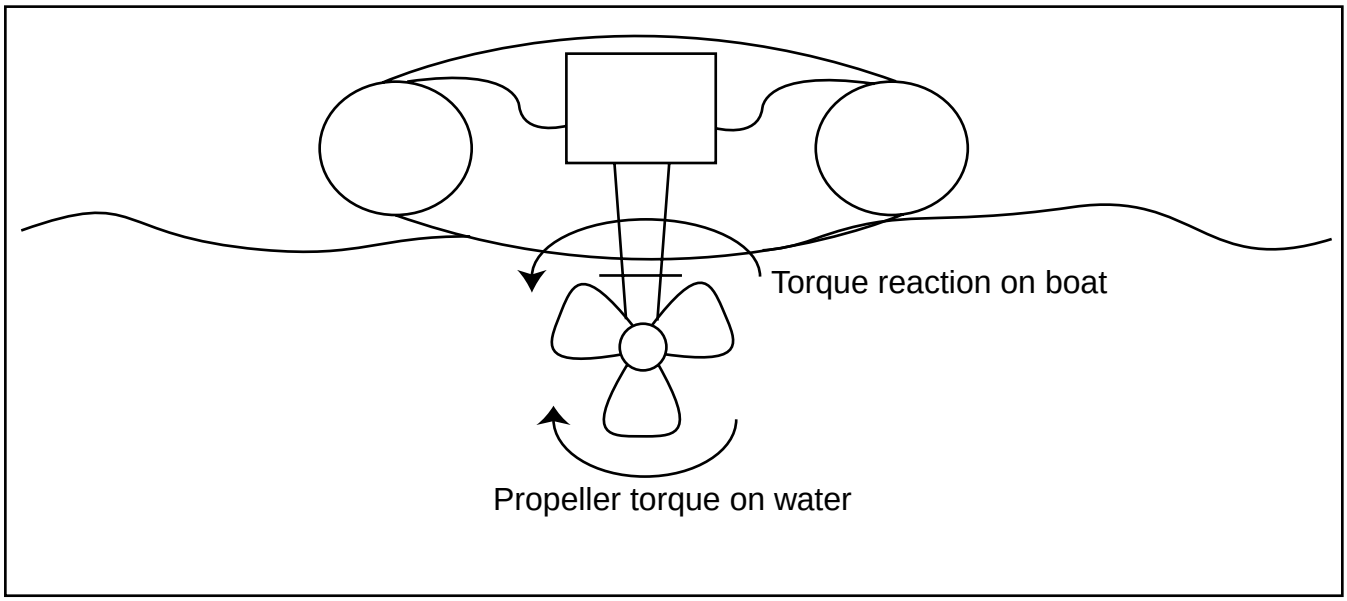
In order to rotate an immersed propeller, it is necessary to apply a torque about its axis of rotation. Thus, a clockwise rotating propeller will require a clockwise torque **(Figure 5)**. In this case the torque is applied by the engine mounted on the stern of the boat, which must suffer an equal, but opposite, reaction torque. The engine and boat will, therefore, experience an anti-clockwise torque.

On a boat having an engine fitted with a propeller which rotates clockwise when viewed from astern, this reaction torque will tend to rotate the boat anti-clockwise about its longitudinal axis. Its port side will be immersed deeper in the

water, and its starboard side will rise. This effect is insignificant where engine power is small relative to the boat's displacement. However, where the power to displacement ratio is high, the effect can be sufficient to require correction. This is often done by asking occupants to move to the starboard side of the boat, and/or to position the steering to starboard so that the helmsman's weight is acting on the starboard side.

If uncorrected, the greater immersion of the boat's hull on the port side can result in increased drag on the port side, and a corresponding tendency for the boat to steer to port.

Figure 5



The 'paddle wheel' effect

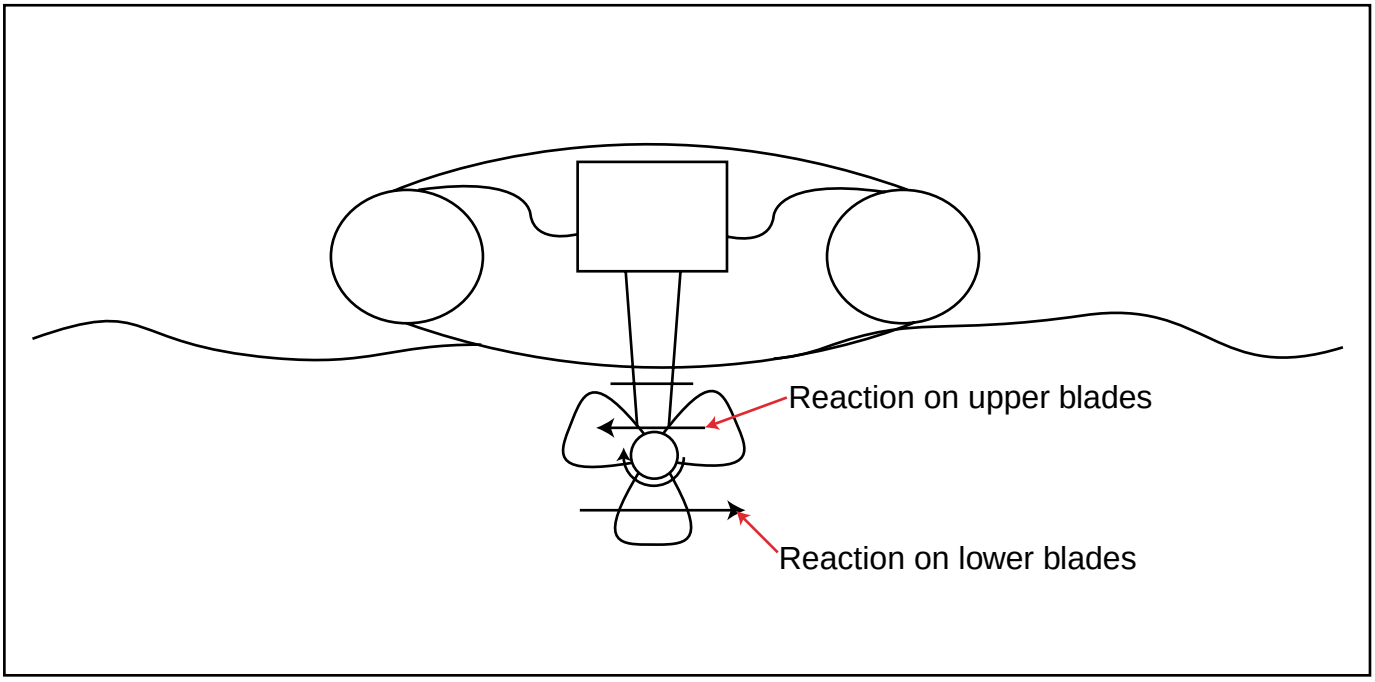
Another hydrodynamic result of a propeller's rotation is the generation of a transverse thrust. This is sometimes referred to as the 'paddle wheel' effect, and results in the stern of a craft 'walking' sideways.

A propeller immersed by only half its diameter clearly generates forces from only those blades in the water. These forces will have a transverse, or sideways, component that will tend to move the propeller sideways, as a paddle wheel would. Again, for a clockwise rotating propeller, the direction of this movement is towards starboard.

With the propeller fully immersed, those blades closest to the surface will be working in water which is rather more disturbed than that acting on the lower blades. This water is likely to be affected to a much greater degree by entrained air bubbles, and so be of lower density. This may prevent the upper blades from generating as much force as the lower blades.

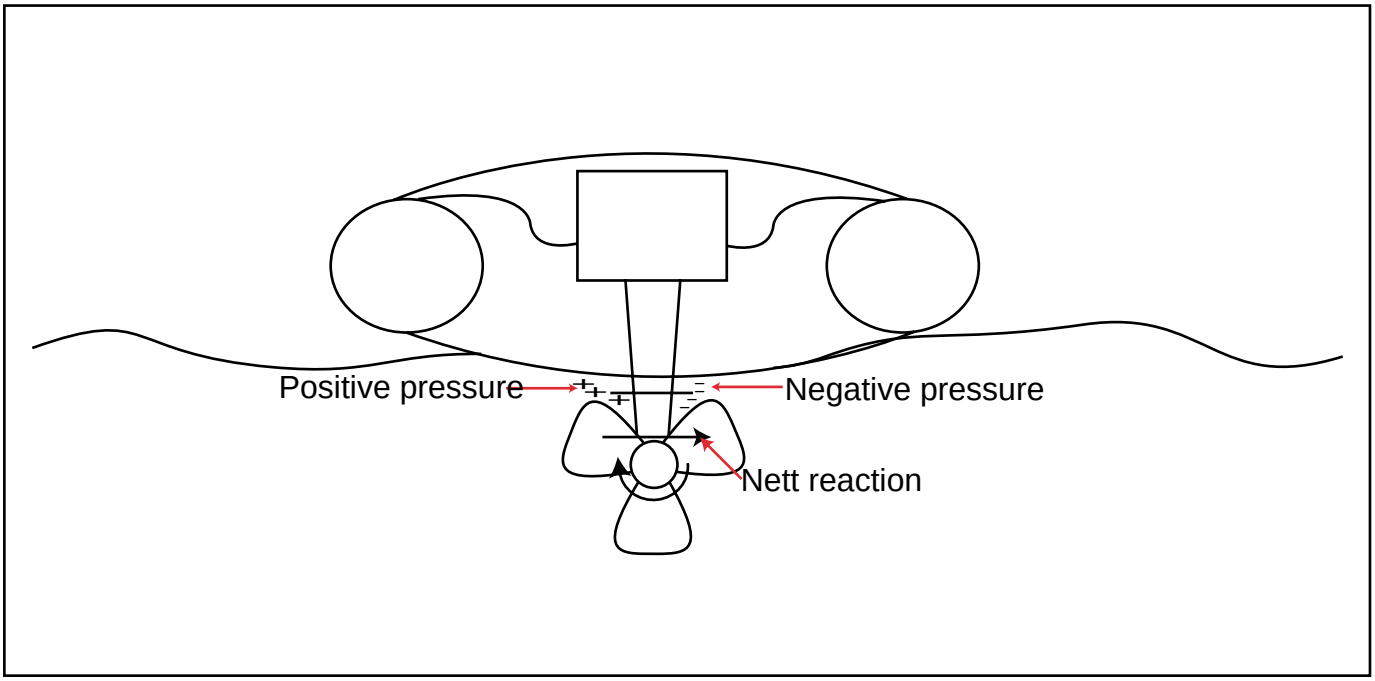
Thus, even when the propeller is fully immersed, the transverse force generated by the lower blades is not matched by that from the upper blades **(Figure 6)**. The nett effect is that the propeller still attempts to move or ‘walk’ to starboard.

Figure 6



This effect may be in addition to the results of pressure differences acting on the engine’s skeg, drive and gear casing **(Figure 7)**. Both effects will, for a clockwise rotating propeller, tend to move the propeller and outboard engine to starboard.

Figure 7



Other transverse forces

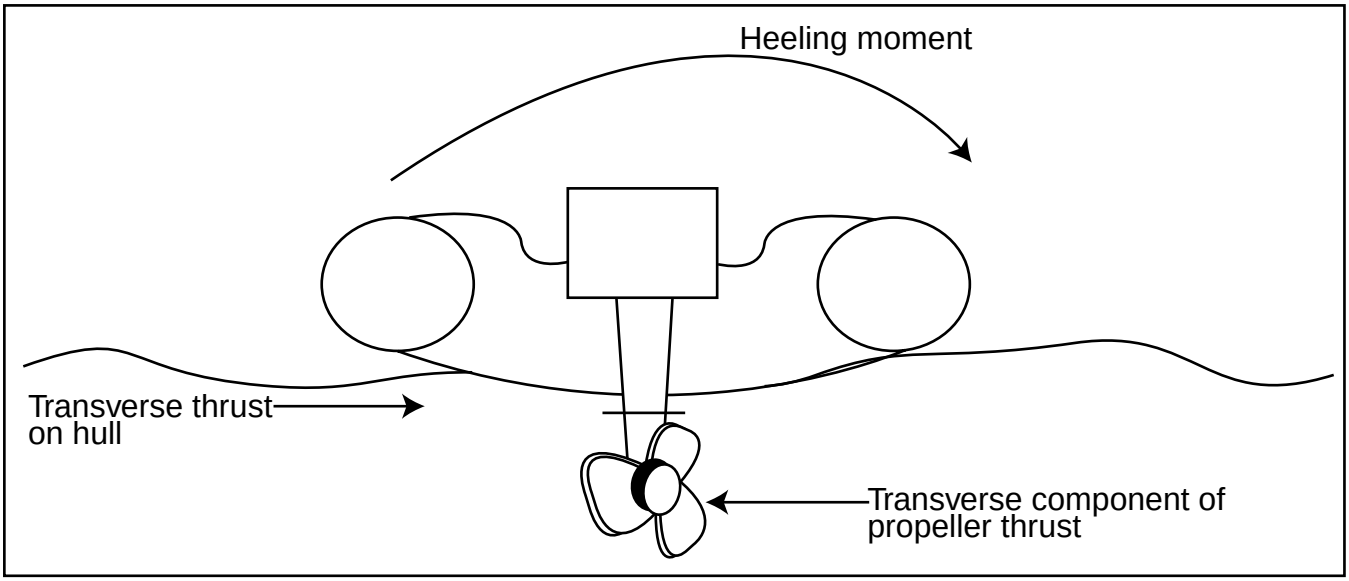
When an outboard engine and propeller are turned from amidships, a transverse component of the propeller's thrust is being applied. Indeed, this is the mechanism by which a boat is steered.

The propeller on an outboard engine is normally arranged so that it is lower than the lowest part of the boat's hull. The propeller thrust is, therefore, also lower than the hull. When the boat is steering a straight course, this may be of little significance.

However, when the boat follows a steady turn a 'couple' or 'moment' is generated by this transverse propeller force, and the transverse water force on the hull **(Figure 8)**. This will have the effect of heeling the boat. Because the propeller's force is lower than the hull's force, the heel will be towards the direction of the boat's turn.

When turning to starboard, under power, the boat will heel to starboard, and vice versa.

Figure 8



Offset thrust

The effects of entrained air and shallow immersion can cause the propeller's thrust to be offset from its centreline. However, this offset is in the vertical plane, and has no significant effect on a boat's handling.

Provided a propeller's axis of rotation is parallel with the surface of the water, there will be no significant offset of thrust in the horizontal plane. This will be a desirable condition if efficiency is important **(Figure 9a)**.

However, in normal operation, fast craft will often trim due to the bows rising. The boat's engine will also tilt back through a similar angle. The propeller might then not be in its optimum attitude for maximum efficiency.

Outboard motors fitted to many boats are equipped with power-trimming systems, which allow an engine's attitude to be altered to compensate for this effect and to maintain propeller efficiency. Adjustment to trim, and thus propeller attitude, can be made under power. The Mercury 75 engine on the Arimar RIB is fitted with a system of this type.

A propeller, not at the optimum attitude, can develop thrust which is offset in the horizontal plane. This can affect the boat's steering.

When an engine and propeller are trimmed in, with the propeller's axis sloping upwards from aft to forward, the downward moving blades of a clockwise rotating propeller will present a larger angle of attack to the water than the upward moving blades **(Figure 9b)**. These blades are to starboard of the propeller's centreline and, within limits, these downward moving blades will generate a greater thrust than the others. The nett propeller thrust is thus offset towards these downward moving blades, which is towards starboard on a clockwise rotating propeller.

With the engine and propeller trimmed out, and the propeller's axis sloping down from aft to forward, the effect is reversed and nett thrust is offset to port **(Figure 9c)**.

Figure 9a

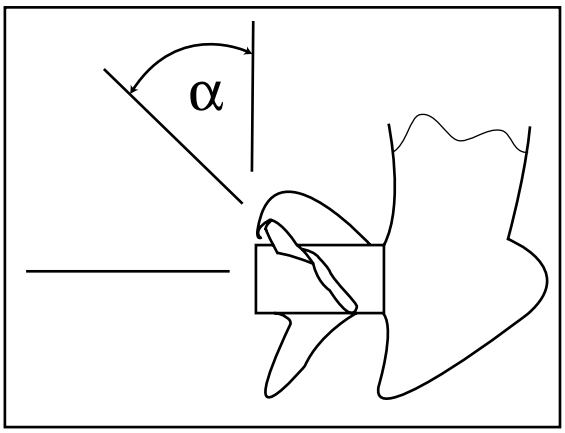


Figure 9b

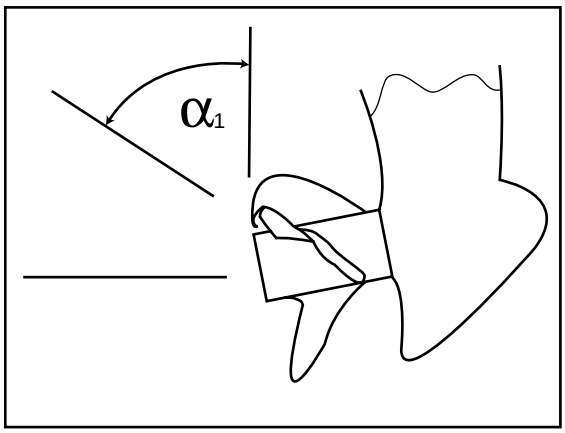
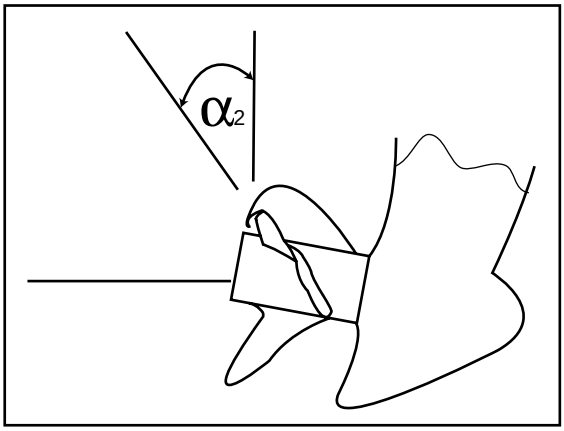


Figure 9c



$\alpha_2 < \alpha < \alpha_1$

2.7 ENGINE POWER

The effects of these forces on a boat are dependent on their magnitude, relative to the mass of the boat. In turn, their magnitude is related to engine power. Thus engine power/unit of boat displacement becomes significant; usually referred to the power to weight ratio of an engine and boat combination.

The difficulty of reliably predicting the influence of many of these forces, without in-water trials, means that a boat with high power to weight ratio is likely to have relatively large and unpredictable forces applied to it. The magnitude of these forces is likely to catch a novice helmsman unaware.

2.8 EFFECT ON STEERING

Many forces will influence the steering of a small fast craft. In attempting to predict the nett effect, it is necessary to recognise that, on an outboard engine, the propeller and engine are mounted on a set of bearings which allows them to swivel about a near vertical axis for steering purposes. The angle of swivel is normally limited to about 30° either side of amidships.

As the propeller is aft of the steering axis of the engine, any transverse force on the propeller will tend to cause the engine to turn towards an extreme position. A force moving the propeller to starboard causes the engine to swivel to starboard which corresponds to a starboard turn of the boat. Similarly, a force acting to port swivels the engine to port, which corresponds to a port turn of the boat.

If the swivelling motion of the engine is completely prevented by the steering system, possibly by the helmsman securely holding the wheel to prevent it rotating, the effect on the boat's steering is reversed. A starboard force on the propeller then moves the boat's stern to starboard and its heading is changed to port, and vice versa.

The effects of this boat-to-engine articulation are further likely to catch a novice unaware.

2.9 STEERING COMPENSATION

Because of the numerous variables of trim, immersion, propeller speed, boat speed, helm angle etc. it is difficult to completely compensate for all unwanted effects under all conditions.

Transverse propeller forces can be balanced by fitting and carefully adjusting a trim or torque tab fitted behind the propeller. These are vertical control surfaces which act in a similar fashion to a rudder, to generate a balancing transverse force. However, these tabs cannot normally be adjusted when the boat is making way, and their setting cannot be seen by occupants when the boat is afloat. Further, the torque tabs will have the desired effect only within a limited range of conditions.

Following the accident, the Mercury 75 engine on the RIB was found to have its torque tab set at 10° to starboard. This setting would be expected to generate a starboard transverse thrust on the engine. The force it generates would be added to any propeller-induced forces acting to starboard.

Setting this torque tab to port would be expected to reduce the magnitude of the propeller-induced forces acting to starboard.

Although setting the torque tab to port would be expected to reduce the forces to starboard, because of the number of other forces generated, as previously set out, the influence of this setting on the RIB's behaviour might not have been critical.

2.10 IN-WATER TESTS

The in-water tests, described in section 1.8, largely confirmed the anticipated directions of transverse propeller forces. However, the tests indicated that these forces were probably greater than would normally be expected. Although these might have been reduced by suitable adjustment of the torque tab on the engine, this possibility was not explored during the tests. However, the tests showed that the magnitude of the forces suggests that, as installed, the engine was not ideally matched to this RIB.

Two important reasons for this are:

- The steering feedback from the engine and propeller could surprise a novice, probably sufficiently enough to result in loss of control, and

- The attempts to partly reconstruct the likely sequence of events which threw the three people from the RIB into the water. This resulted in the boat suddenly stopping and heeling 15° to port, almost sufficient to eject the test crew into the water, even though they were anticipating the likely effects of the manoeuvre.

Prudently, this part of the tests was carried out at less than full speed. Even so, it was found that if the helm was released while making a turn to port, the wheel and engine rapidly went to starboard, causing the boat to take a sharp starboard turn. Had this exercise been carried out at full throttle, and with crew who were unprepared for dramatic events, there is no doubt that the crew would have stood little chance of remaining in the boat.

Since this test, and the results, closely resemble the recollections of the surviving witnesses, it is reasonable to suppose that it offers a probable explanation of how the three occupants of the RIB were thrown into the water on the afternoon of 22 September 2000.

2.11 THE KILL-CORD

Where there is a possibility of the helmsman being thrown overboard, many small high-speed craft are fitted with a safety device which shuts off the engine should that happen. This is seen as an essential safety device, and is known as a “kill-cord” or “deadman’s handle”.

At the time of the accident, the kill-cord was not attached to anyone. This allowed the Arimar RIB to run on out of control. Had the kill-cord been attached to any of the RIB’s three occupants, the fatal consequences of this accident would have been avoided.

It is unclear why the kill-cord was not reattached when the dealer exchanged places with the female. However, the dealer had already formed the impression that he was handing control of the RIB to someone with experience, and who, therefore, was familiar with the importance of the kill-cord. He probably assumed that close supervision was not necessary.

It is observed that neither person taking control of the RIB on that excursion had followed any formal training course in the operation of high-speed craft, even though the dealer was very experienced.

2.12 TRAINING

It is possible for a novice to become expert in the handling of high-speed craft without following any form of training. He or she becomes self-taught. However, the process is likely to be protracted and, unless the individual has an inherent sense of caution, hazardous.

Apart from teaching an individual boat-handling skills, training courses can also serve the important function of instilling vital safety-related practices. One who is self-taught might never encounter a situation where the need for these practices becomes obvious and, without training or some other prompt or justification, they might never be convinced of their importance.

The disciplined use of the engine kill-cord on small fast craft may be one of these practices. Many untrained users of these craft may well use kill-cords as they were intended. However, they are unlikely to have been subjected to the disciplined approach taken by formal training courses, where their use is emphasised repeatedly. This is one item where incorrect use can cause a trainee to fail to gain the desired certificate of competence.

Although the dealer who initially had control of the Arimar RIB was very experienced, he had followed no formal training course in the use of high-speed craft. The training he had undertaken was with slower craft. Also, much of his earlier experience on fast craft had been in a military environment. Here, less emphasis is placed on some safety matters, such as the use of engine kill-cords, than during commercial training courses.

Crews of pleasure vessels, operating from the boat show marina, are not required to have any form of certificate of competence in boat handling. However, the exhibitors of these high-speed craft should be able to demonstrate the highest standards to the visiting public, and particularly to any who are invited afloat for a demonstration. To the boating and yachting population, exhibitors' safety standards should be an example of best practice. Anything less will reflect badly on the exhibitor and the industry, and fail to cultivate essential safety practices among non-professional seafarers.

Southampton International Boat Show is recognised as a showcase for the industry dealing with recreational craft. The show gives the industry the opportunity to demonstrate high standards of safety. It is difficult to see how these high standards can be fully demonstrated unless the demonstrating coxswains are trained to a recognised standard.

Craft needing to use either of the demonstration areas, and by definition capable of high speeds, should be demonstrated by coxswains who have successfully completed a recognised training course in the operation of fast craft. Nobody, but these qualified and designated coxswains, should take control of the craft when operating from the boat show marina.

Setting out clear requirements for the qualification of those using fast craft will overcome the need for any individual to make an assessment of another's competence. In this incident, the dealer had formed the opinion that the woman involved was sufficiently conversant with fast craft to pass control to her. She was, however, inexperienced, and his assessment was based entirely on the contents of a discussion between them.

It is recognised that some exhibitors of fast demonstration craft at Southampton International Boat Show did follow a policy of using only qualified persons to man their craft. All should be urged to do so.

The organisers of the boat show have little direct control on the subject of competence of exhibitor's staff. However, they are seen as a suitable route by which recommendations can be efficiently passed to exhibitors. For this reason all recommendations aimed at exhibitors are directed at the organisers.

2.13 THE RESCUE

Following the accident, the first vessel on the scene was the RIB which effected a rescue. Even though its coxswain was aware of the runaway RIB circling nearby, he did not hesitate to move towards the people in the water. In doing so he placed himself, his boat and its occupants, in some danger. A level of danger recognised by some others who, understandably, held back from closing on the runaway RIB.

Although caution and prudence are essential during water-based activities, the coxswain of this RIB showed that where the lives of others are threatened, the instinct for self-preservation can be overcome.

Once the three had been recovered from the water, the runaway RIB posed no significant threat to life. However, the local lifeboat rammed it and one of her crew jumped aboard to bring it under control; putting himself at some risk. Although in certain circumstances these actions would be commendable, such as when lives are at stake, this was an unnecessary risk. Other less dramatic and less hazardous methods were available to stop the RIB, even, in the extreme, by allowing the craft to run until its fuel was exhausted.

2.14 LANDING OF CASUALTIES

The coxswain of the rescuing RIB was able to alert the show's control staff to the incident and of the need for medical assistance. The summoning of first-aid and an ambulance, and arranging for its access to the show's site, appeared to follow the guidance set out in the organisers' major incident plan.

However, on returning to the marina with the injured person and the two survivors, the rescuing boat had difficulty finding and manoeuvring to a berth.

It was clearly sensible to attempt to berth close to the landward end of the marina in order to ease access for emergency staff and vehicles. However, the approaches to these berths were congested with craft, and the adjacent pontoons were full of members of the public.

The major incident plan covers the need for access to the marina from land for ambulances, stretchers etc. However, it is silent on the need for access from the water in an emergency.

To prevent any repetition of these problems, the organisers are recommended to keep a designated berth always available for landing casualties. This berth should be clearly identifiable from the water, and its purpose and status should be made known to all exhibitors and emergency services by being included in the show's major incident plan.

SECTION 3 - CONCLUSIONS

3.1 FINDINGS

1. The Arimar RIB is considered to have been operating as a pleasure vessel at the time of this accident. [2.1]

2. The Arimar RIB was required to comply with The Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations. It complied with these requirements. [2.1]

3. The Arimar RIB complied with The Recreational Craft Directive 94/25/EC, (the Directive). [2.2]

4. The notifying body, RINA, declared compliance with the handling requirements of the Directive when the Arimar RIB is fitted with an engine up to 88kW, without specifying its weight. [2.2]

5. The responsibility for ensuring acceptable engine choice and installation is, in effect, placed on the end user. [2.2]

6. Some areas of the safety management of some fast craft demonstrations at Southampton International Boat Show could be improved. [2.3]

7. The owners, Sowester Simpson-Lawrence, did not pass important safety-related documentation to persons manning the demonstration Arimar RIB. [2.4]

8. Many users of the Marchwood demonstration area, including those in the Arimar RIB, either ignored, or were not aware of, the 15 knot speed limit. [2.5]

9. At high engine outputs the Arimar RIB was subjected to many propeller-induced forces acting on the boat and its steering. The magnitude of these forces is likely to catch a novice helmsman unaware. [2.7]

10. The effects of the boat-to-engine articulation are also likely to catch a novice unaware. [2.8]

11. The engine’s torque tab was not set to counteract the expected transverse propeller forces to starboard. [2.9]

12. The three occupants were thrown from the Arimar RIB shortly after the helm was released when making a turn to port. [2.10]

13. Release of the helm caused the steering, and thus also the RIB, to turn sharply to starboard. [2.10]

14. Sideslip of the hull was arrested, causing the three people on board to be ejected from the boat by inertia. [2.10]

15. At the time of the accident the engine's kill-cord was not attached to any of the occupants. This allowed the Arimar RIB to run on out of control. [2.11]

16. Had the kill-cord been attached to any of the RIB's three occupants, the fatal consequences of this accident could have been avoided. [2.11]

17. It is unclear why the kill-cord was not attached to the driver. [2.11]

18. Neither person taking control of the RIB on that excursion had followed any formal training course in the operation of high-speed craft. [2.11]

19. Although aware of the runaway RIB circling nearby, and the associated danger, the coxswain of the rescuing RIB did not hesitate to move to recover the people in the water. [2.13]

20. On returning to the Southampton Boat Show marina with the casualty and the two survivors, the rescuing boat had difficulty finding and manoeuvring to a vacant berth. [2.14]

21. The major incident plan for Southampton Boat Show does not cover emergency access to the marina from the water. [2.14]

3.2 CAUSES

1. The occupants of the Arimar RIB were thrown overboard as a result of the violent behaviour of the craft caused by steering control being lost at full throttle.

2. The Arimar RIB ran out of control because the engine emergency kill-cord was not attached to the driver.

3. Users of the Arimar RIB were not aware of important safety information.

4. The owners of the Arimar RIB had no clear policy to ensure its safe operation.

SECTION 4 - RECOMMENDATIONS

The organisers of Southampton International Boat Show are recommended to:

1. Keep a designated berth free for landing casualties from any waterborne accident. The purpose of this berth should be identified in the show's major incident plan.

2. Pass the following MAIB recommendations to exhibitors who demonstrate craft using either of the designated demonstration areas:

   Exhibitors are recommended to:

   - Pass copies of all documentation concerned with waterborne safety to staff, or other persons who demonstrate their craft.

   - Document their safety policy regarding demonstration craft and to pass this to demonstrator staff.

   - Have only designated and qualified persons in control of their demonstration craft.

   The Southampton harbourmaster is recommended to:

3. Consult with the organisers of Southampton International Boat Show to consider whether there is a need to retain the speed limit in the Marchwood demonstration area. Should this speed limit be seen to be of value, he is recommended to ensure all craft comply with it.

SECTION 5 - SUBSEQUENT ACTION

Following the accident, and before receipt of the report, the organisers reviewed their conditions governing the use of demonstration boats at the show and:

1. Have allocated a suitable emergency berth on the marina for such accidents.

2. Have insisted on a minimum qualification for all helmsmen of demonstration boats.

3. Requested specific risk assessments are submitted to the organisers in relation to demonstration boats.

4. Issued an instruction that no passenger may take the helm of demonstration craft.

5. Require kill-cords to be fitted and used at all times on craft such as RIBs and open sports boats demonstrated at the show.

Marine Accident Investigation Branch
August 2001

Associated British Ports Southampton - Notice to Mariners

ABP ASSOCIATED BRITISH PORTS SOUTHAMPTON

NOTICE TO MARINERS

NO 16 (T) OF 2000

SOUTHAMPTON INTERNATIONAL BOAT SHOW
RIVER TEST – ESTABLISHMENT OF TEMPORARY PONTOON COMPLEX

1 **NOTICE IS HEREBY GIVEN** that works are in progress to assemble and moor a pontoon complex to temporary piles off the sea wall at Mayflower Park, situated on the north-west side of the Royal Pier, Southampton.

2 During the week of the Boat Show, **15th to 24th September 2000 inclusive,** the pontoon complex will be used to berth displayed craft and will be floodlit at night. There will be considerable activity in the vicinity, which will include inshore rescue and helicopter air/sea rescue displays, firing of pyrotechnics for demonstration purposes, sail pasts and other demonstrations.

3 Vessels navigating past the floating exhibits during this period are requested to reduce speed consistent with safe navigation and navigate with caution.

4 As in previous years two areas have been designated to allow exhibitions to demonstrate craft in excess of 6 knots (see chartlets attached).

Area 1: (Speeds up to 15 knots) in the River Test is contained within the Marchwood Channel and is marked on the eastern end by joining No 2 Swinging Ground Buoy to Cracknore Buoy, and on the western end by a line joining 3 temporary yellow buoys. The southern boundary is marked by the Marchwood Buoy and 4 temporary yellow buoys.

Area 2: (Speeds over 15 knots) off the Netley Shore in the Hovercraft Testing Area is contained within an area bounded by 3 Hovercraft buoys and 16 temporary yellow buoys.

5 Any craft that exceeds 6 knots outside of these designated areas north of a line joining Hythe Pier to Weston Shelf buoy, other than by special dispensation, will be in breach of Harbour Bye Laws and be liable to prosecution.

6 The show organisers will provide a security patrol boat that will be in attendance to assist in the compliance by exhibitors with the Harbour Master's directions and Bye Laws and will maintain a listening watch on VHF Channel 12.

7 Dismantling of the Pontoon Complex will take place over a period of days after the Boat Show and be completed by 30 November 2000.

Vessel Traffic Services Centre
Berth 37
Eastern Docks
Southampton SO14 3GG

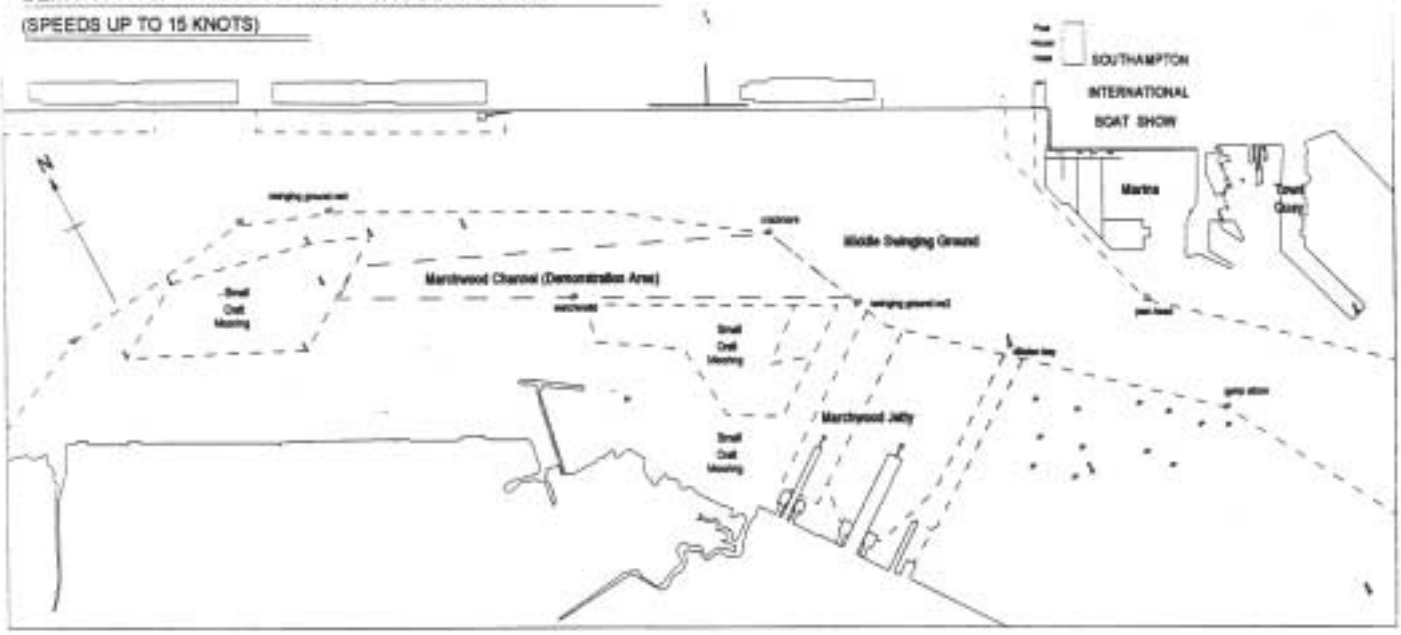
Captain J S Chestnutt
Harbour Master

30 June 2000

Owners, Agents, Charterers, Marinas, Yacht Clubs and Recreational Sailing Organisations should ensure that the contents of this Notice are made known to the masters or persons in charge of their vessels or craft.

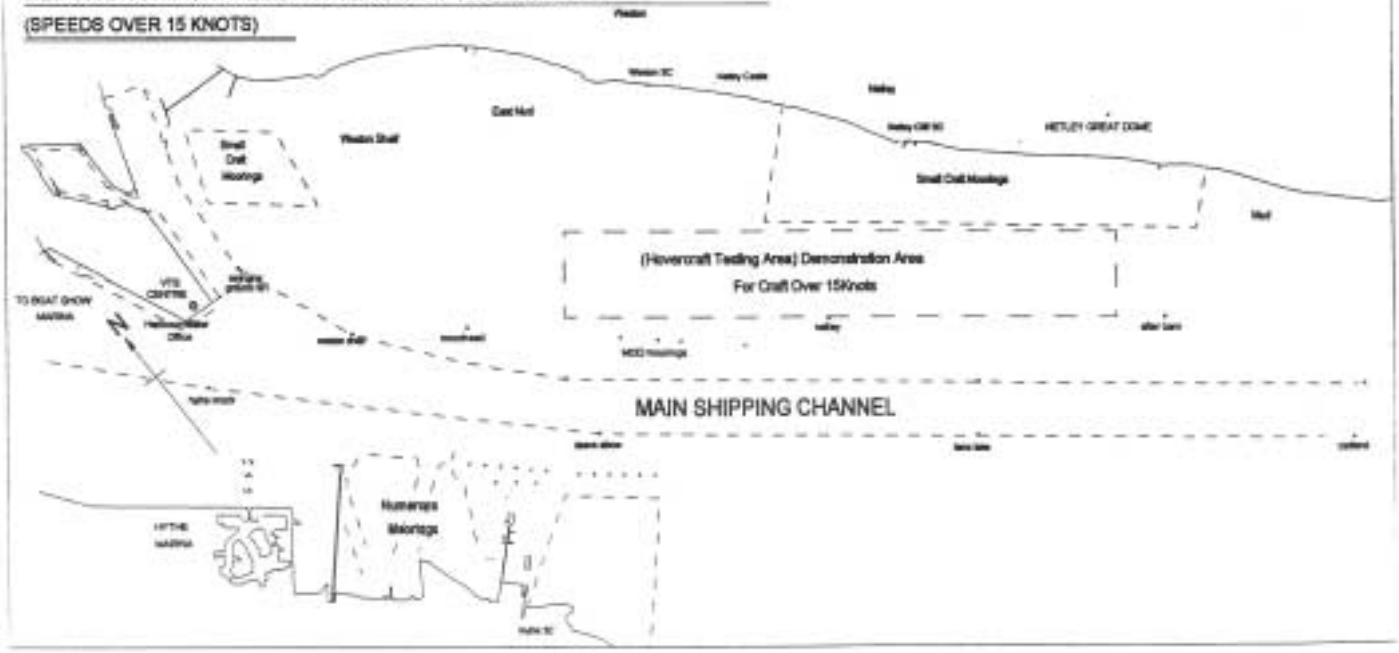
DEMONSTRATION AREA 1 - MARCHWOOD CHANNEL

(SPEEDS UP TO 15 KNOTS)

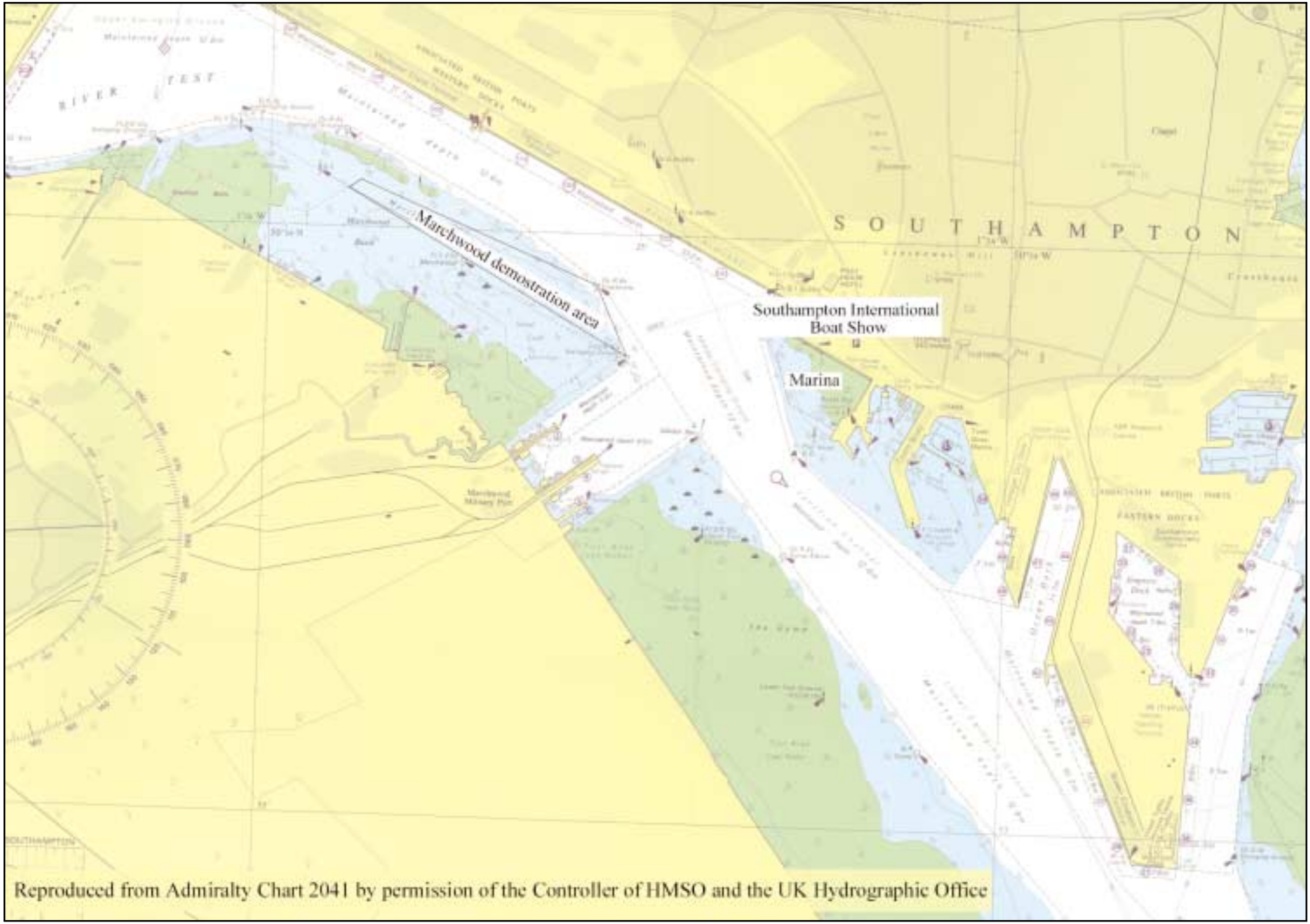


DEMONSTRATION AREA 2 - HOVERCRAFT TESTING AREA

(SPEEDS OVER 15 KNOTS)



Map of Southampton International Boat Show marina


RIVER
TEST
SOUTHAMPTON
Marchwood demostration area
Southampton International
Boat Show
Marina
EASTERN DOCKS
Reproduced from Admiralty Chart 2041 by permission of the Controller of HMSO and the UK Hydrographic Office