

Report on the investigation of
the console detachment of the
rigid inflatable boat

Partner 1

Studland Bay, Poole

20 April 2008

Marine Accident Investigation Branch
Carlton House
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Extract from
The United Kingdom Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2005 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

BMF	-	British Marine Federation
BV	-	Bureau Veritas
BERR	-	Department for Business, Enterprise and Regulatory Reform
CIN	-	Craft Identification Number
DoC	-	Declaration of Conformity
DTI	-	Department for Trade and Industry
EEA	-	European Economic Area
ESO	-	European Standards Organisations
EU	-	European Union
GRP	-	Glass Reinforced Plastic
HIN	-	Hull Identification Number
hp	-	Horse power
ICOMIA	-	International Council of Marine Industry Associations
ISO	-	International Organization for Standardization
kg	-	kilogram
kW	-	kilowatt
m	-	metre
MIC	-	Manufacturer's Identification Code
mm	-	millimetre
N	-	Newton
RCD	-	Recreational Craft Directive
RIB	-	Rigid Inflatable Boat
RSG	-	Recreational Craft Sectoral Group
RYA	-	Royal Yachting Association
UK	-	United Kingdom
UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency

Times: All times used in this report are UTC + 1 unless otherwise stated



SYNOPSIS

On 20 April 2008, when participating in a Royal Yachting Association (RYA) powerboat course, three trainees and their instructor were conducting high speed manoeuvring drills on *Partner 1*, a new RIB-X, XP510 rigid inflatable boat. Soon after the boat had started a wide turn to starboard at a speed of between 20 and 25 knots, its combined double jockey seat and steering console suddenly detached and the instructor was thrown overboard. The trainee helmsman was also thrown to port and his movement was sufficient to operate the engine kill cord. With the

boat stopped in the water, the trainees re-positioned the console, then re-started the engine and recovered the instructor. The instructor's automatic lifejacket had inflated and he was uninjured.

The investigation identified a number of factors which contributed to the detachment of the console, including:

- The console module was secured to the deck with only four screws, of which only one had effectively penetrated the deck's plywood base.
- The console module had not been fitted in accordance with the RIB manufacturer's guidance.
- The RIB was not returned to an approved installer, as intended by its manufacturer, before entering service.
- The craft was not thoroughly inspected before being delivered to its owner.

A number of safety issues regarding the quality management of the RIB's manufacturer and its conformity with the Recreational Craft Directive were also identified during the investigation. These included:

- The manufacturer did not effectively monitor the activities of its dealers and did not take sufficient precautions to prevent its RIBs being put into service without being subjected to a pre-delivery inspection by an authorised installer.
- The manufacturer did not meet its responsibilities with respect to the requirements of the RCD. In particular, a CE marked builder's plate was affixed to the hull before the craft had been completed and its adherence to the essential requirements of the RCD had been verified.

In May 2008, the MAIB wrote to RIB-X (manufacturer) recommending that it determine which of its boats that had been sold had not been completed by approved installers, and to check that the standard of rigging on these hulls was at least equivalent to the standard detailed in its own procedures.

To prevent a similar accident occurring in the future, the British Marine Federation (BMF) and the Royal Yachting Association have taken action to raise the awareness of the issues raised by this accident, and the Department for Business Enterprise and Regulatory Reform (BERR) has undertaken to review current guidance on the application of the RCD and facilitate action by industry to ensure that boats sold within the UK are safe to operate. The International Council of Marine Industry Associations (ICOMIA) has been recommended to advise its members that CE marked builder's plates should not be affixed to partly completed boats. A further recommendation has been made to RIB-X aimed at improving its quality management system and compliance with the RCD. A recommendation has also been made to Holes Bay Marine, which is intended to ensure it meets industry best practice.



Partner 1

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *PARTNER 1* AND ACCIDENT

Vessel details

Registered owner	:	Privately owned
Type	:	RIB-X Explorer XP510
Built	:	2007
Construction	:	GRP hull with rubber inflatable tubing
Length overall	:	5.1m
Gross tonnage	:	450kg
Engine power and type	:	80hp Mariner four stroke outboard motor

Accident details

Time and date	:	1515 on 20 April 2008
Location of incident	:	50° 39.7N 001° 56.4W, Studland Bay, Poole, Dorset
Persons on board	:	4
Injuries/fatalities	:	Nil
Damage	:	Combined console and seat module detached from the deck

1.2 NARRATIVE

At about 0915 on 20 April 2008, three men arrived at Cobbs Quay Marina, in Poole, for the second day of a Royal Yachting Association (RYA) level 2 powerboat training course. The 2-day course was being conducted on the RIB-X XP510 rigid inflatable boat (RIB), *Partner 1*, which was owned by one of the trainees.

The day began in the classroom, where the trainees learnt basic coastal navigation and chart work techniques. Accompanied by an instructor, they then embarked in *Partner 1* and drove the RIB across Poole harbour to Studland Bay, where they arrived at about 1100. A series of practical drills was then conducted before joining another RIB from the training school and anchoring for lunch at about 1300.

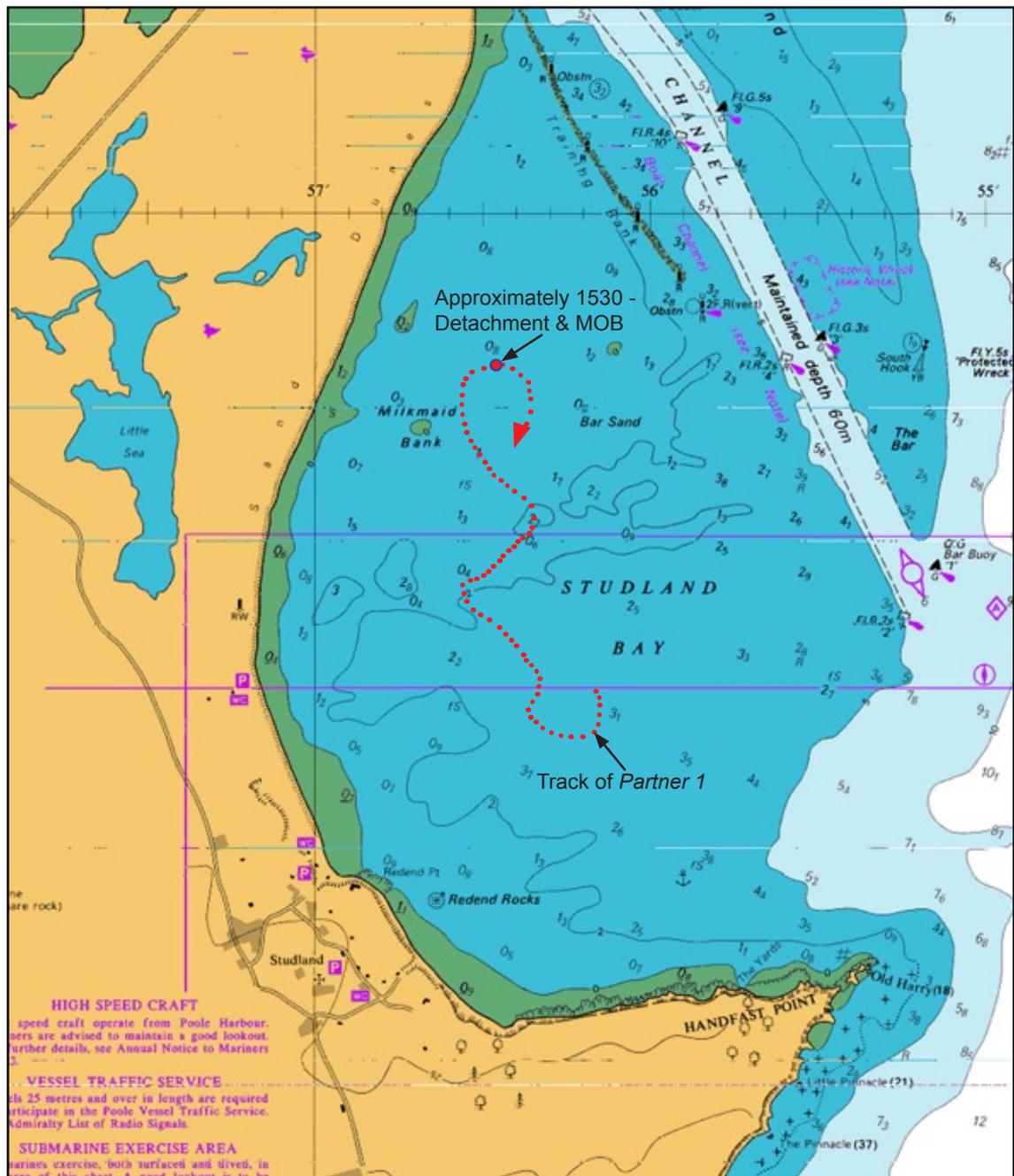
After lunch, the RIBs weighed anchor and the instructor in *Partner 1* demonstrated manoverboard recovery procedures to his students. These were then practised by the trainees, with each taking a turn as helmsman to recover a marker float. On completion, the instructor demonstrated a number of high speed manoeuvres, during which the straight line speed was limited to 25 knots in accordance with the training school's safety procedures. The exercise included a series of S manoeuvres and culminated in a steady U-turn at the end of each run (**Figure 1**). Two trainees each completed four circuits on the helm, without incident. The third successfully completed three circuits and began his final leg at about 1515. He was sitting on the console's double jockey seat with the instructor standing to his right, holding onto the console and seat module's chrome handle bars. The other trainees were sitting next to each other on the double bench seat at the stern of the RIB (**Figure 2**).

As the trainee helmsman neared the end of his last run, the RIB's speed was between 20 and 25 knots. The trainee eased back on the throttle to reduce speed and then commenced his final U-turn to starboard. As he did so, he again increased the RIB's speed to assist his control of the manoeuvre. Suddenly, without warning, the combined double jockey seat and console module detached from the deck and the helmsman and instructor were thrown to port.

The helmsman maintained his grip on the steering wheel and landed face up on the RIB's buoyancy tube. His legs remained in the boat but his head and upper torso entered the water. He was prevented from going fully overboard by the cables attached to the console (**Figure 3**), which also restricted the displacement of the console itself. The movement of the helmsman was sufficient for the engine kill cord, which was attached to his leg, to operate and stop the engine. The instructor was thrown over the helmsman, and landed in the water on the port side of the RIB; his lifejacket inflated automatically. The helmsman's lifejacket also inflated when his upper body entered the water.

The helmsman was pulled back into the RIB by one of the trainees and was placed on the stern seat to recover; he was uninjured but was badly shaken. The console module was then relocated to its original position. Visual contact was maintained with the instructor, who appeared to be unharmed.

The trainees reset the kill cord toggle switch but could not start the outboard motor. They initially assessed that the power cables had been torn out during the detachment, but then realised the engine was still in gear. As soon as the engine was returned to neutral gear it started without difficulty. With the owner of the boat at the helm, the RIB was manoeuvred alongside the instructor, who was then successfully recovered.



Studland Bay training area

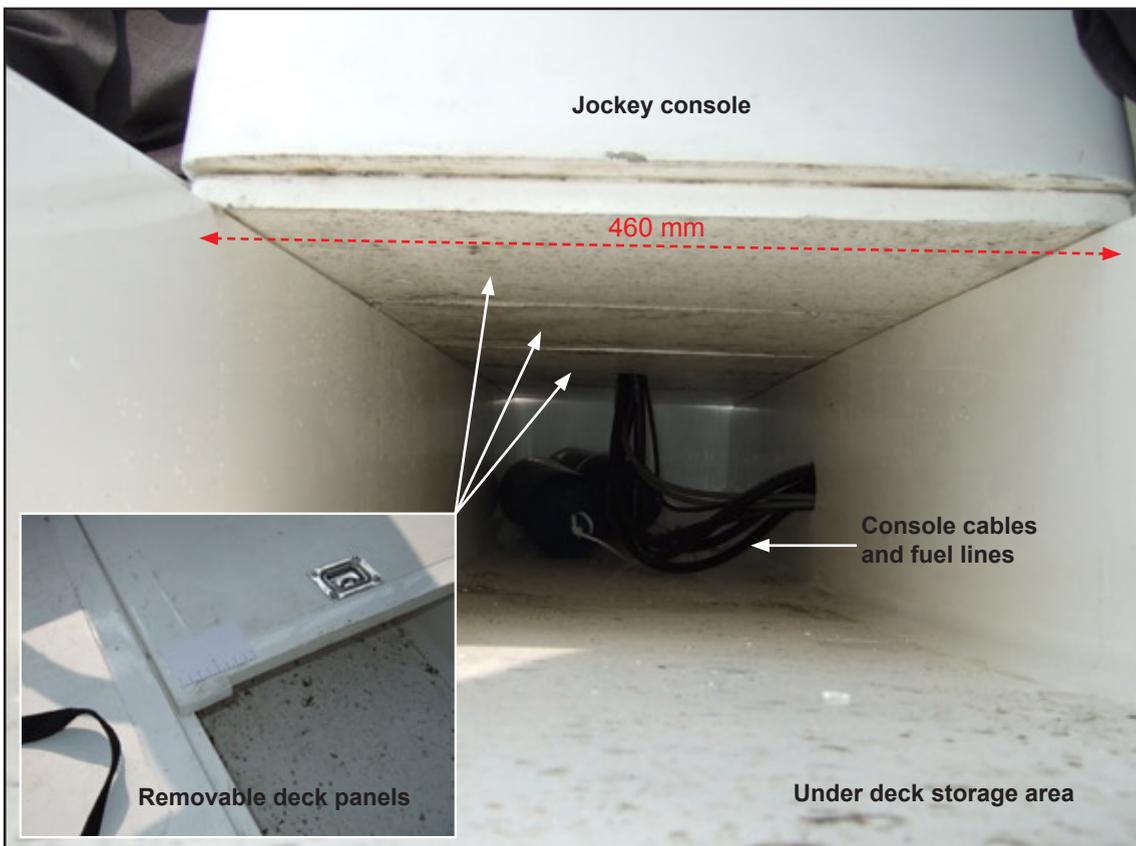
The instructor decided the boat was in a safe condition to return to the marina at slow speed. Once alongside at Cobbs Quay, the training school provided warm drinks and dry clothes. It also arranged for *Partner 1* to be placed at a secure berth, and reported the incident to both the MAIB and RYA.

Figure 2



Positions of the trainees and instructor at the time of the accident

Figure 3



RIB-X XP510 under deck storage channel

1.3 THE OCCUPANTS OF THE RIB

The owner of the RIB was 30 years old. He had successfully completed the RYA's competent crew and day skipper (coastal) practical courses in Gibraltar in 2007, but he had no powerboat experience. The helmsman at the time of the accident was 59 years old; he had no boating experience and was the father of the owner. The third trainee also had no previous boating experience, and was the owner's brother-in-law. All three trainees were well rested and could swim.

The instructor was 57 years old and had worked at the training school (Powerboat Training UK) for 2 years. After leaving school he joined the merchant navy and spent 13 years at sea as a deck officer. He later joined the police force, and spent the final 9 years of a 25 year career, working in the Dorset marine section. The instructor had extensive knowledge of the harbour and the coastal waters around Poole, and held the RYA's yacht master (commercial) and advanced powerboat instructor qualifications. He was also well rested prior to the accident.

1.4 ENVIRONMENTAL CONDITIONS

The wind was easterly force 2 to 3, the sea state was calm and visibility was good. The sea temperature was estimated to be between 8 and 10°C.

1.5 SAFETY EQUIPMENT

Before *Partner 1* was permitted to be used for training, the RIB was examined by the course instructor. This was in accordance with the powerboat school's procedure for the use of student-owned boats. The safety inspection did not include assessing the integrity of seat and console securing arrangements.

The RIB was equipped with a kill cord, which was designed to stop the engine in the event of the helmsman moving away from the steering position. At the time of the detachment, one end of the cord was worn around the driver's right thigh and the other was attached to the engine cut off switch. The outboard motor was not fitted with a propeller guard.

The training school provided heavy weather clothing and a 150N auto-inflate lifejacket for each trainee. The instructor wore heavy weather clothing, a 270N auto-inflate lifejacket and was carrying a waterproof hand held VHF radio. The trainees carried mobile phones. A set of distress flares and smoke floats was provided by the training school.

1.6 RIB-X EXPLORER XP510

The RIB-X Explorer XP510 is a 5.1m long RIB and can carry up to 9 people. The Explorer range is available in 6 lengths between 4.5 and 7m. The hulls used in the construction of the Explorer models are manufactured in South Africa by Falcon Inflatables (Pty) Ltd and are the same design as those used in Falcon's own SR range.

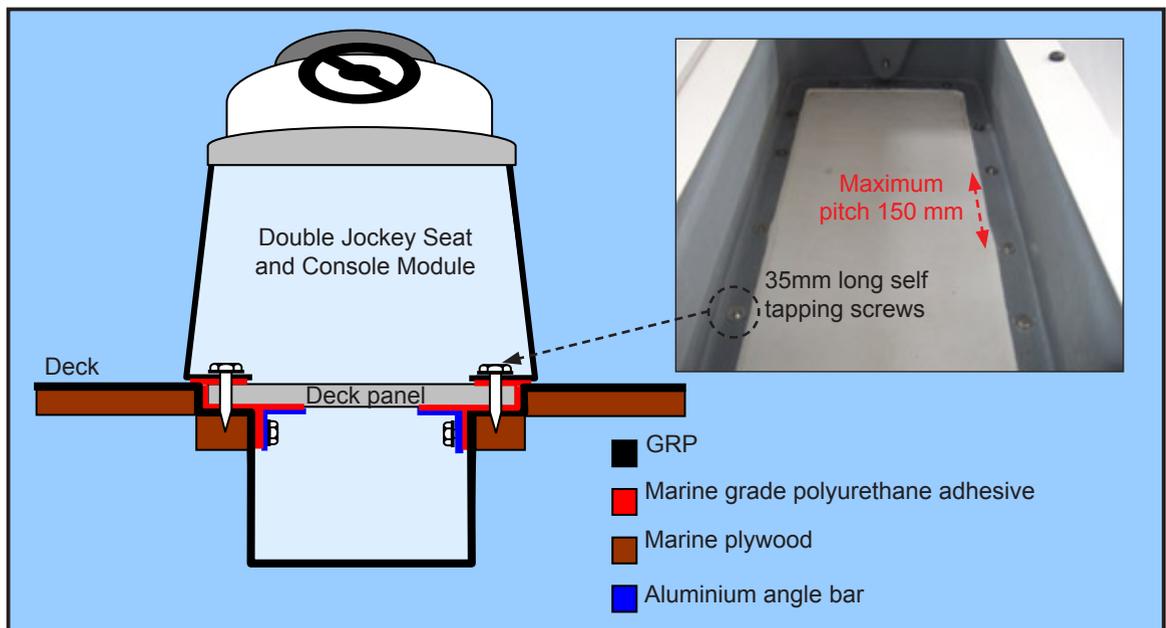
The RIBs are advertised as having a number of features fitted as standard, including: non-feedback steering, sports steering wheel, under deck cable ducting, console and seats. The number, type and location of the seating and console arrangements varies depending on the personal requirements of the purchaser. The customer is also able to choose the size and type of outboard motor fitted, up to the maximum power rating

approved by the manufacturer. RIB-X and its dealerships advertise the maximum power rating for the XP510 as 130hp (**Annex A**). However, the craft's builder's plate gives a maximum engine size of 76kW (100hp). *Partner 1* was fitted with an 80hp Mariner outboard motor and a hydraulic steering system.

The XP510 has a recessed channel which runs the full length of the deck along its centre line. The channel is used for storage and is covered by a row of 20mm thick, 500mm square, removable panels. The double jockey seat and console module sits on top of the deck panels (**Figure 3**). Generic instructions for the securing of consoles and seats to its craft are provided by RIB-X in a commissioning guide (**Annex B**). This stipulates that the modules must be bonded to the deck using a marine grade polyurethane adhesive. The structure is then reinforced by passing a series of M6 (minimum size) stainless steel self tapping screws, or coach bolts, through the module's landing flange and into the deck. The screws are fitted with penny washers and spaced at maximum intervals of 150mm.

However, the XP510 is the only RIB in the Explorer range to be fitted with a full length under deck storage channel, and RIB-X expect the removable deck panels to be supported by lengths of aluminium angle bar, or a suitable alternative, before they are bonded to the deck (**Figure 4**). This requirement is not documented in the RIB-X commissioning guide.

Figure 4



Manufacturer's approved securing arrangement for a combined double jockey seat and console module to the XP510 hull

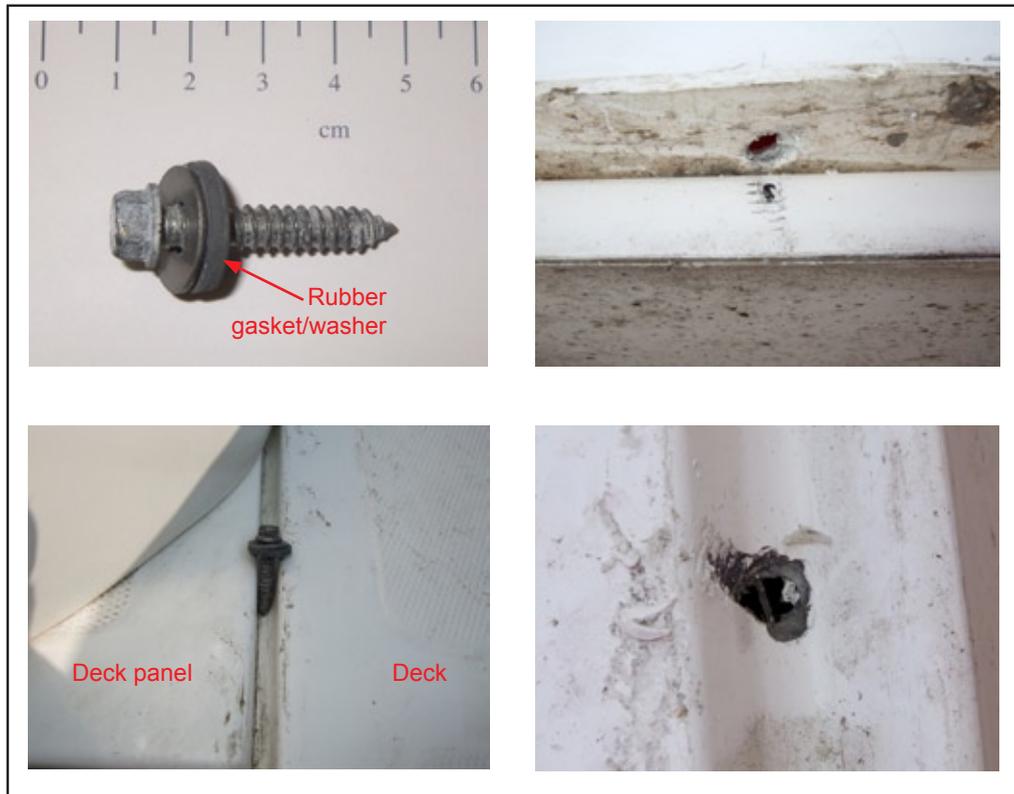
1.7 POST-INCIDENT EXAMINATION OF THE RIB

1.7.1 Initial examination

Partner 1 was examined at Cobbs Quay Marina shortly after the accident. The initial inspection identified that the console module had detached from the deck, but was still connected to the hull by its steering and engine control cables. The module had been secured to the deck by 4 x 35mm long M6 stainless steel self tapping screws, each fitted with steel penny washers and rubber gaskets/washers. Only one of the screws (port aft)

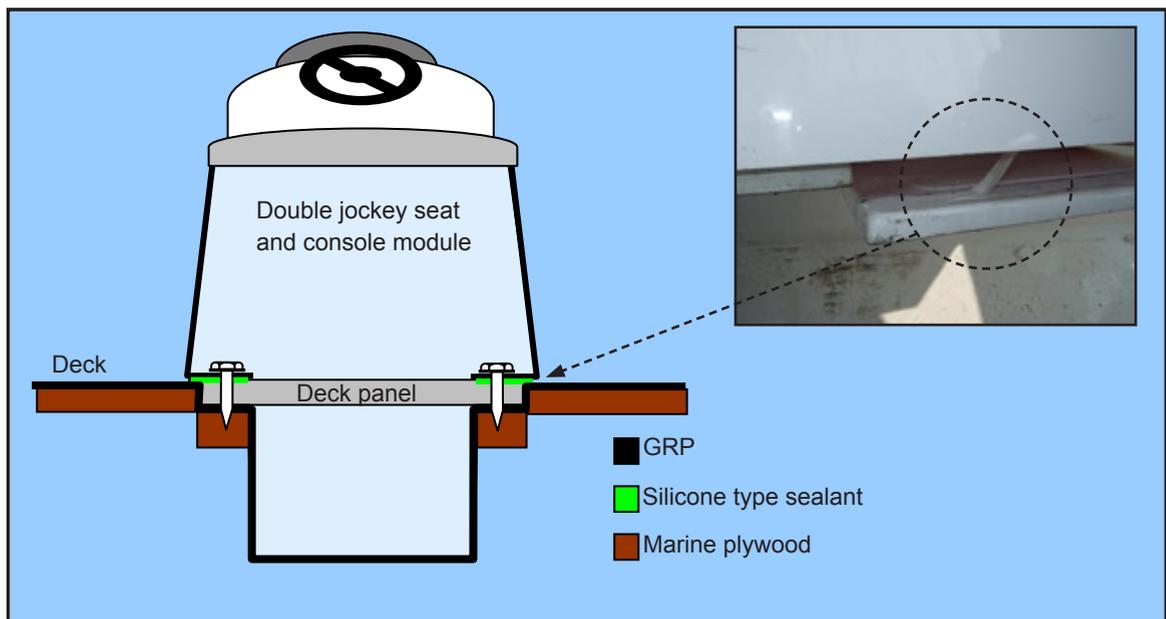
had effectively penetrated the deck's 18mm thick plywood base. The others passed through the gaps between the deck edge and the removable panels, merely scoring the glass-reinforced plastic (GRP) coating of the deck and the edge of the panels (**Figure 5**). A layer of silicon-based sealant was found between the console module landing flange and the deck panels (**Figure 6**).

Figure 5



Partner 1 console module securing screws

Figure 6



Partner 1 console module securing arrangement

1.7.2 Royal Yachting Association (RYA) survey

Partner 1 was assessed by an RYA representative against the technical requirements specified in ISO 6185-3¹. The RYA Technical Department's report (**Annex C**) concluded that *Partner 1* did not satisfy the requirements of section 5.11 of the standard and would not have passed the test described in clause 7.3.2.2². Section 5.11 of the standard states:

'There should be no damage or malfunction to either the seating or to any related attachment systems when tested in accordance with clause 7'.

Partner 1 was also found not to meet the buoyancy compartmentation requirements of the standard. It was calculated that a minimum of five buoyancy compartments was required; *Partner 1* was fitted with four. The specifications advertised by RIB-X and its dealers state that the XP510 has six compartments (**Annex A**).

The report also noted that a Craft Identification Number (CIN), as required by the Recreational Craft Directive (RCD), had not been affixed to the hull.

1.7.3 Manufacturer's survey

Partner 1 was returned to RIB-X by its owner in June 2008. RIB-X identified a number of installation practices that fell short of its requirements. The key findings were:

Engine mounting and hydraulic steering system:

- No sealant had been applied to the top two engine securing bolts, allowing potential water ingress to the bare wood within the transom
- Several screws used to secure the steering mounting plate were missing
- The hydraulic hoses were incorrectly routed, causing kinking when turning to port (**Figure 7**)
- The steering system did not function through the full travel of the steering arm, limiting the movement of the engine to port and starboard
- The helm pump unit was found to be loose
- The engine was fouling on the steering mechanism and damage was evident (**Figure 7**)
- The steering helm unit securing arrangements were found to be loose, and had been fitted without sealant being applied.

Electrical Installation:

- Cables were unsupported and ducting tubes were not used
- Unprotected cables passed through deck openings, presenting a chaffing hazard (**Figure 8**)

¹ ISO 6185-3:2001 – Harmonised standard for inflatable boats with a maximum power rating of 15kW and greater.

² Clause 7.3.2.2 - Testing – lightly loaded: 'Embark a coxswain only. The total period of test shall be not less than 45 minutes with the motor controls set to develop maximum forward thrust. Head the boat directly up wind and then successfully downwind on courses of approximately 45° separation. This will give a minimum of at least five separate courses encountering a head-on, bowquarter, beam, sternquarter and following sea condition. Turn the boat sharply towards the end of each course to port and starboard'.

- The electrical isolator switch and battery were located in the bilge area; grease had not been applied to the terminals and corrosion was evident (**Figure 9**)
- The battery box was not adequately secured to the deck.

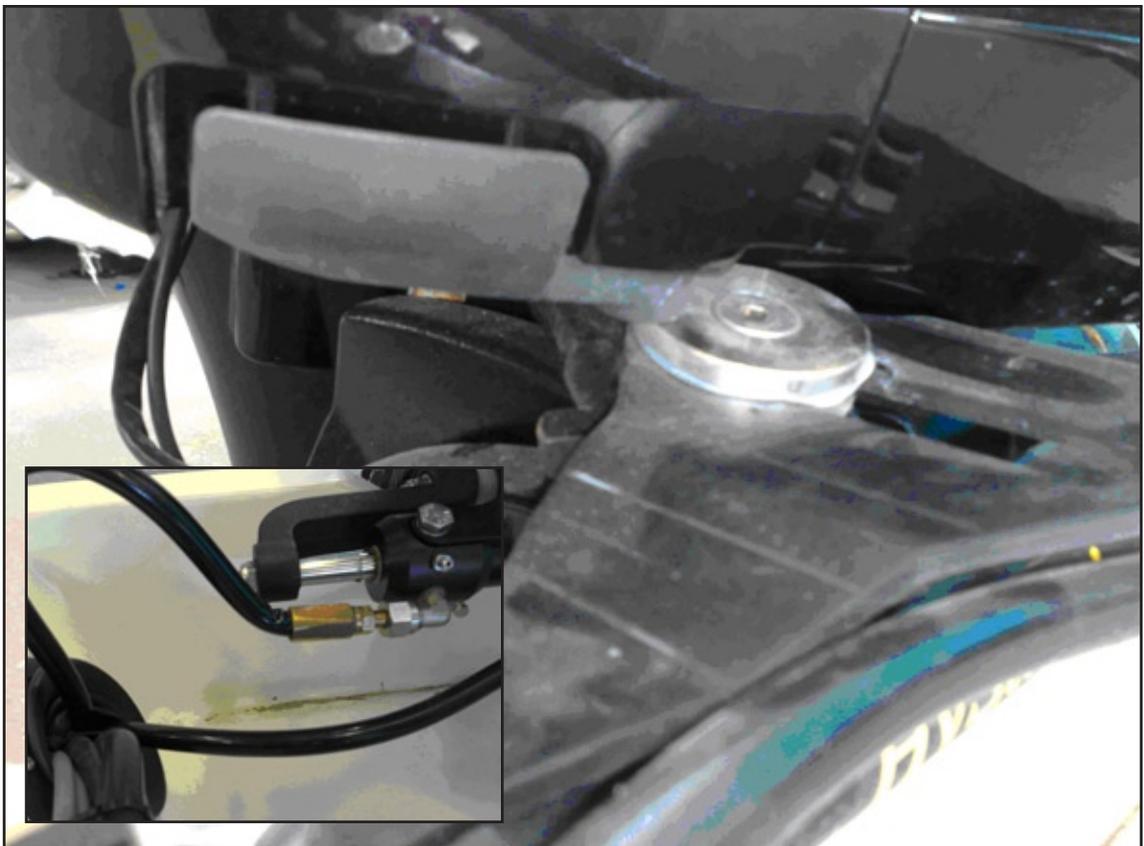
Fuel System:

- The fuel lines were run along the same route as the electrical cables and were subject to the same chaffing hazard
- A fuel/water separator had not been fitted
- The fuel tanks were located under the double jockey seat, and no form of ventilation had been provided, allowing a potential for fuel vapour build up (**Figure 10**)
- The fuel tanks were not appropriately mounted or secured, allowing them to move within the confines of the console module.

General rigging:

- The seat and console module was secured to the removable deck panels by a silicone type sealant
- The removable deck panels were secured down using only four screws
- Deck panel support brackets/bars had not been fitted.

Figure 7



Partner 1 Steering mechanism

Figure 8



Partner 1 cable runs

Figure 9



Partner 1 battery box and electrical isolator switch



Partner 1 fuel tanks

1.8 BOAT HISTORY

The bare hull of *Partner 1* was manufactured in South Africa in February 2005 and was exported to the United Kingdom (UK) with a CE marked builder's plate attached (Figure 11).

Figure 11



Bare hulls imported into the UK from South Africa

RIB-X sold the hull to one of its dealerships, Poole Boating Centre Ltd, on 19 July 2006. At the request of the dealer, a stainless steel double bench seat and A-frame was fitted at the stern. A combined double jockey seat and console module and trailer were also supplied. RIB-X secured the console module to the deck of the boat with four transit screws to allow it to be transported to the dealer's showroom.

The RIB-X Explorer XP510 remained on display in the showroom for over a year. In an attempt to increase the chance of selling the RIB, the dealer decided to fit an engine and steering system and make it ready for use.

On 30 August 2007 Holes Bay Marine fitted an 80hp Mariner outboard motor and hydraulic steering system. It also supplied and fitted removable fuel tanks, fuel lines, throttle arrangement, control cables, a battery and an isolator switch.

The RIB was sold on 23 February 2008 and delivered to the purchaser on 1 March 2008. An opportunity for the dealer to demonstrate the boat to its owner did not materialise, and the newly named *Partner 1* was put into water for the first time on 19 April 2008, the first day of the RYA training course. Initially, the RIB's engine could not be started due to a fault on the electrical isolator switch.

1.9 FALCON INFLATABLES (PTY) LTD

Falcon is based in South Africa, and began manufacturing RIBs in 1985 under the name of Infanta Inflatables. It first exported its products in 1989 and changed its name to Falcon Inflatables in 1993. Falcon manufactures and sells a variety of RIBs including its SR model range. Bureau Veritas (BV) conducted stability and buoyancy tests on the Falcon 510 SR (**Annex D**) and issued an attestation of conformity for the entire SR range against the European Union (EU) RCD for stability and buoyancy in 1999 (**Annex E**). Falcon self certified the 510 SR RIB's compliance with ISO 6185-3 in 1999 (**Annex F**). It was classified as a type VII³ RIB and was manufactured to design category C⁴.

Falcon has over 20 distributors of its products within South Africa. Its RIBs are fully rigged out in the factory before being delivered to its distributors' showrooms. As it is not economically viable to transport completed RIBs to countries within the European Economic Area (EEA) Falcon exports bare hulls and other boat parts as separate components. These are stacked in containers and delivered to its distributors or selected importers within the EEA. Its distributors construct and sell Falcon products while importers such as RIB-X use the parts to build their own brand of RIBs. RIB-X has a verbal exclusivity agreement with Falcon to import its products into the UK.

1.10 RIB-X LTD

RIB-X, based in Leicestershire, was formed in 2003 and is a full member of the British Marine Federation (BMF)⁵. It manufactures and markets three ranges of RIB: the Explorer, Expert and Exige, which are sold either directly to the customer or via dealerships. At the time of the accident, RIB-X had seven dealership agreements within the UK and Ireland. These agreements were verbal; no written documentation was issued.

RIB-X does not manufacture or design any of the component parts used in its products. It imports bare hulls from companies in South Africa, primarily Falcon for its Explorer range and Stingray Marine for its Expert range. Components such as seats, consoles, fuel tanks, A-frames etc are both imported and sourced within the UK. Outboard motors, steering systems and instrumentation and control systems are purchased from various UK agents.

³ Type VII – powered boats of 15KW and greater

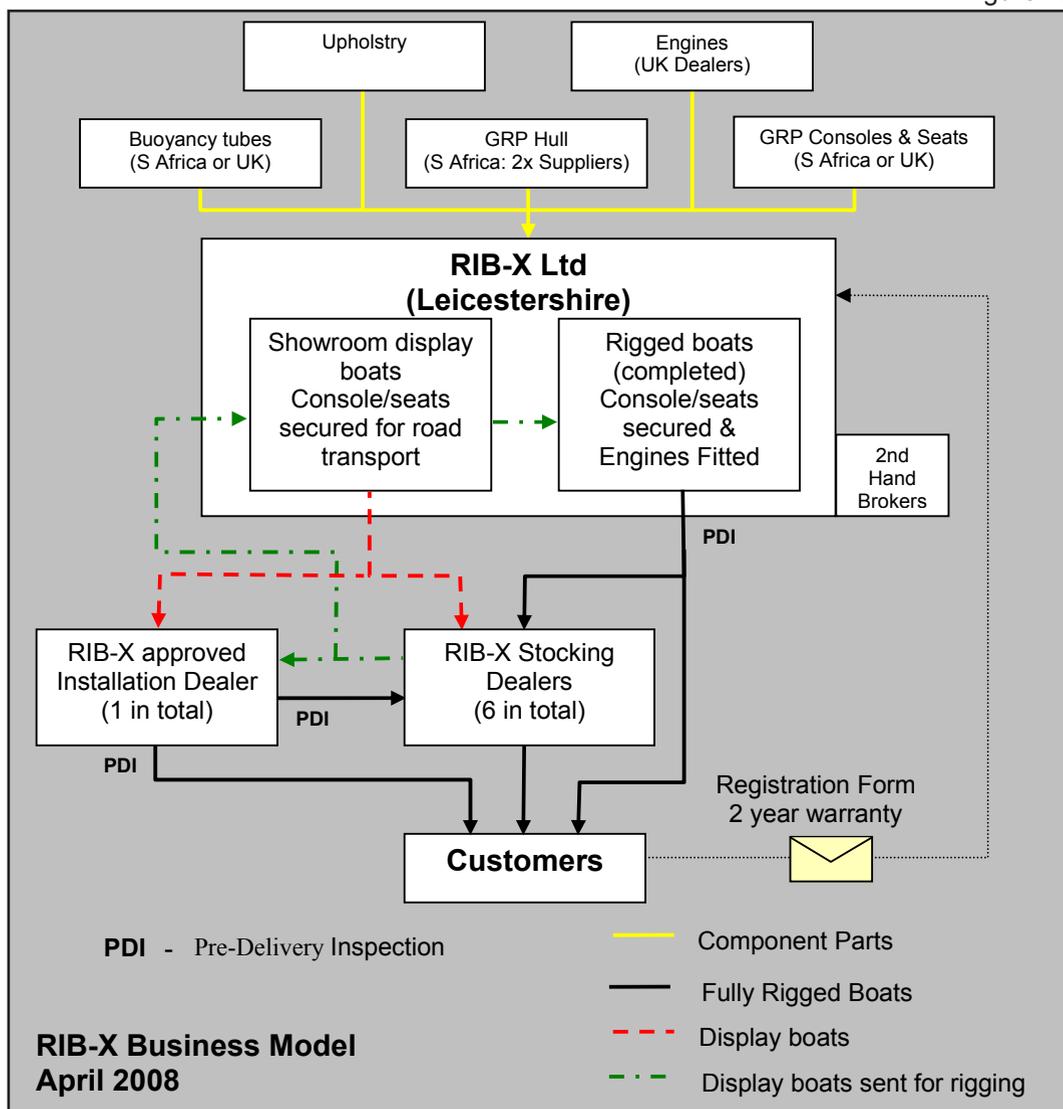
⁴ Design category C – Inshore: Designed for voyages in coastal waters, large bays, estuaries, lakes and rivers where conditions up to, and including, wind force 6 and significant wave heights up to, and including, 2m may be experienced.

⁵ The British Marine Federation is the trade association for the leisure and small commercial marine industry.

RIB-X dealerships are required to buy and hold two boats in stock at all times. Due to the prohibitive cost of a fully rigged RIB, and to offer a wider product choice to customers, dealers are permitted to stock showroom display models i.e. bare hulls with a variety of seating and console arrangements fitted temporarily. Once sold, dealers are required to return the RIBs to the RIB-X factory, or an approved installer, for rigging.

At the time of the accident, only its North Wales based dealership had been approved as an installer by RIB-X. Such approval is only given after a prospective installer's technicians have completed a 2 day training course at the RIB-X factory. On completion of the course the technicians are issued a copy of the RIB-X commissioning guide (**Annex B**). The RIB-X business model is illustrated in **Figure 12**.

Figure 12



RIB-X business model

1.11 POOLE BOATING CENTRE LTD

Poole Boating Centre started trading in 2005 and sold various makes of RIB, including RIB-X models. It stocked and displayed unriggered boats and arranged for them to be fitted out once sold to a customer. It sold eight RIB-X boats between August 2005 and February 2008, four of which were rigged out by Holes Bay Marine. The dealer had relied on verbal communications to agree the scope of the work packages required.

The dealer had a limited knowledge of boat rigging and installation practices, but he was aware that the console and seat modules fitted to the decks of the showroom display boats supplied by RIB-X were secured by only transit screws. He was also aware that the modules needed to be secured to the deck using an adhesive and a set of screws spaced at intervals of no greater than 150mm.

The dealership ceased trading on 31 March 2008.

1.12 HOLES BAY MARINE LTD

Holes Bay Marine, based at Cobbs Quay in Poole, is an established marine engineering company which holds a number of dealership agreements with engine manufacturers such as 'Mariner'. It is also a full member of the BMF. The company had fitted Mariner outboard motors, steering systems and various other components to RIBs for Poole Boating Centre on several occasions. On each occasion, it issued an invoice and work sheet to the dealer itemising the work carried out and its costs. The invoices indicate that the company permanently secured the console modules to the deck on only one of the four RIB-X boats it rigged. The work it carried out on *Partner 1* did not include permanently securing the console module to the deck.

Holes Bay Marine had not been approved by RIB-X as an installer, and none of its staff had attended the RIB-X installation course. The company did not hold a copy of the RIB-X commissioning guide (**Annex B**).

In February 2007 a RIB-X Explorer XP575, sold by Poole Boating Centre in July 2006 and rigged out by Holes Bay Marine, was returned to RIB-X by its owner in part exchange for a larger RIB. On inspection, RIB-X discovered its console module had not been bonded to the deck and was held in position by only its transit screws. The RIB's electrical cabling and fuel supply systems also did not conform to the requirements detailed in the RIB-X commissioning guide.

1.13 OWNER'S WARRANTY

RIB-X issues a 2 year owner's warranty to its customers with each of its new RIBs. The terms of the warranty and a registration form are included in the owner's manual (**Annex G**). To activate the warranty the owner must complete the registration form and return it to RIB-X. A condition of the warranty is that the boat must be rigged directly by RIB-X or by one of its approved installers. In addition to Poole Boating Centre, the MAIB is aware of at least two other RIB-X dealerships which had arranged for its display RIBs to be rigged by unauthorised installers.

1.14 RECREATIONAL CRAFT DIRECTIVE

1.14.1 General

Directive 94/25/EC on recreational craft as amended by Directive 2003/44/EC was introduced by the European Commission and ensures a uniform level of safety in the design and manufacture of recreational craft throughout the EEA. The RCD applies to all craft, including '*partly completed*' boats⁶ (with some exemptions) placed on the market or put into service and intended to be used for sporting or recreational purposes, with a hull length of between 2.5 and 24m.

⁶ A partly completed boat is a boat consisting of a hull or a hull and one or more components.

1.14.2 Essential requirements

The 'essential requirements' referred to in Article 3, and detailed in Annex I, of the Directive lay out the safety, health, environmental protection, and consumer protection requirements that must be met by recreational craft and partly completed boats. It is the manufacturer, his authorised representative⁷ or the person placing a craft on the market for the first time within the EEA who is responsible for ensuring that it meets the essential requirements of the Directive. The main requirements are:

- Conformity assessment procedure
- Maintenance of a technical file
- Provision of a craft identification number (CIN)
- CE mark on the builder's plate
- Declaration of Conformity (DoC)

1.14.3 Conformity assessment

The essential requirements of the RCD must be met before a manufacturer can place its boat on the market within the EEA. This can be achieved through the application of harmonised standards, which gives a presumption of conformity with the Directive's essential requirements. In broad terms, harmonised standards are European standards, which are adopted by European Standards Organisations (ESO), prepared in accordance with the general guidelines agreed between the European Commission and ESO, and follow a mandate issued by the commission. The standards harmonised under the Directive are listed in the Official Journal of the European Communities. With regard to the security of the console and construction of the RIB, the applicable harmonised standard is EN ISO 6185-3:2001: *Inflatable boats-Part 3: Boats with a maximum motor power rating of 15kW and greater*.

However, the application of harmonised standards is voluntary, and is not the only method available to demonstrate conformity. If a harmonised standard is not followed, a manufacturer is obliged to prove that its product conforms to the essential requirements of the Directive by alternative means.

1.14.4 Methods of conformity assessment

The method of assessment of a boat's conformity with the essential requirements of the RCD is dependent on its design category and length. In the case of the RIB-X Explorer XP510, assessment was possible in either Module A (internal production control) or Aa (internal production control plus tests), depending on whether the harmonised standards for stability and buoyancy were complied with.

In February 2007 RIB-X appointed a firm specialising in RCD consultancy to review its processes and provide conformity assessment advice. To date it has not taken any follow up action and is reliant on Falcon documentation to certify the conformity of its Explorer range.

⁷ Authorised representative - any natural or legal person established in the Community who has received a written mandate from the manufacturer to act on his behalf with regard to the latter's obligation under this Directive.

1.14.5 Craft Identification Number (CIN)

The directive states that *'each craft shall be marked with an identification number...'*. Part of the 14 character CIN is the Manufacturer's Identification Code (MIC). The BMF has been appointed by the UK Government to issue MICs and maintain a register of the codes used within the UK. RIB-X was issued its code, RBX, in February 2007. The form of the CIN is laid down in ISO 10087⁸ and should also contain a two character code indicating the country of manufacture, a unique five figure serial number, the month and year of manufacture, and the model year (**Annex H**).

1.14.6 Builder's plate

The RCD states that *'each craft shall carry a permanently affixed plate mounted separately from the boat hull identification number...'* **Annex H** illustrates the minimum information required in Annex I of the RCD, namely:

- manufacturer's name
- CE marking
- boat design category
- manufacturer's maximum recommended load excluding the weight of the contents of the fixed tanks when full
- number of persons recommended by the manufacturer for which the boat was designed to carry when under way.

Annex A of the harmonised standard, ISO 14945⁹, illustrates examples of the recommended design layout for small craft builder's plates. However, it excludes inflatable boats covered by ISO 6185. ISO 6185 clause 8 requires additional information to be added to the builder's plate (**Annex H**).

The CE marking should only be affixed to the builder's plate once the craft is complete and meets the essential requirements.

RIB-X sold the Explorer XP510 (*Partner 1*) to Poole Boating Centre, with the original CE marked builder's plate attached (**Figure 11**). RIB-X does not produce its own builder's plates, or generate CINs, for the boats it builds and places on the market. **Figure 13** shows the detail of the information contained on the builder's plates affixed to *Partner 1* and an unnamed RIB-X Expert XT520.

1.14.7 Technical file

The manufacturer or person responsible for placing a RIB on the market in the EEA must produce and maintain a technical file. This file should contain the evidence required to demonstrate that the complete or part complete craft, its components and engines meet the essential requirements. The technical file should include, but is not limited to:

- Design drawings
- Stability and buoyancy calculations

⁸ ISO 10087:2006 – Small Craft – Craft Identification – Coding system

⁹ ISO 14945:2004 – Small Craft – Builder's plate

- Construction specification
- Methods adopted to meet the essential requirements of the RCD
- Copies of each craft's Declaration of Conformity (DoC)

Figure 13

 <p>Builder's plate for Partner 1. It includes the Rib-X logo and website, technical specifications (76KW, 510 SR, 1070kg), design category C, and manufacturer details (Falcon, South Africa, 2005).</p>	<p>Partner 1</p> <p>Manufacturer: Falcon Serial number: SA FAL 51062 B5 05 Model: 510 SR Year of manufacture: 2005 Design category: C Maximum Load: 1070kg Maximum Persons: 9 Maximum Power: 76KW</p>
 <p>Builder's plate for an unnamed RIB-X Expert XT520. It includes the Rib-X logo and website, technical specifications (5.2 KW, 1000kg, 8 persons), and manufacturer details (left blank, South Africa, 2007).</p>	<p>Unnamed RIB-X Expert XT520</p> <p>Manufacturer: <i>left blank</i> Serial number: SA STI 07780 D7 07 Model: 5.2 Maximum Load: 1000kg Maximum Persons: 8 Maximum Power: 82.01KW</p>

Builder's plates attached to *Partner 1* and an unnamed RIB-X Expert RIB

1.14.8 Declaration of Conformity (DoC)

When module A or Aa is used, it is the responsibility of a manufacturer to provide a DoC for each separate craft, which should include references to the relevant harmonised standards used, or references to the specifications in relation to which conformity is declared. A copy of the DoC must be joined to the owner's manual and a copy put into the technical file. There is no prescribed format for this document, but the RCD lists what it must contain. A model form is provided at Annex XV to the EU Commission services application guide to RCD (**Annex I**).

Partner 1 was sold to the customer without a DoC, as was the case with all RIB-X boats sold by Poole Boating Centre. During the investigation, three RIB-X craft for sale at another RIB-X dealership were also found to have been supplied without a DoC. A blank RIB-X DoC is at **Annex J**.

1.14.9 Partly completed boats

A partly completed boat does not fulfil the essential safety, health, environmental protection and consumer protection requirements of the Directive. The product becomes a completed craft only when it meets these requirements and is placed on the market or put into service as a completed craft. Partly completed boats should not be given a CE marking, but if ownership is transferred a declaration should be issued by the builder (Annex IIIa of the RCD), containing the following information:

- The name and address of the builder
- The name and address of the representative of the builder established in the Community or, if appropriate, of the person responsible for placing on the market
- A description of the partly completed craft
- A statement that the partly completed craft is intended to be completed by others and that it complies with the essential requirements that apply at this stage of construction.

RIB-X does not issue Annex IIIa declarations to its dealerships when it sells showroom display boats.

1.15 RECREATIONAL CRAFT DIRECTIVE GUIDANCE

The EU Commission has produced a consolidated guide to the application of the Directive. This reference document is endorsed by the RCD Experts Group and has been made publicly available. It offers a detailed description of the articles and annexes that make up the RCD and is designed to ensure a uniform interpretation of the Directive by parties directly or indirectly involved with recreational craft. In addition, the Recreational Craft Sectoral Group (RSG) produces guidelines aimed at notified bodies¹⁰ and manufacturers to ensure a uniform technical application and interpretation of the Directive.

1.16 SIMILAR ACCIDENTS

1.16.1 *Time Flies*

In July 2007 a 6.3m RIB, manufactured by Ribquest, was being driven on the River Thames when its seats became detached from the deck causing all three occupants to be thrown overboard. The detachment of the seat modules was attributed to ineffective bonding due to poor surface preparation. In addition, water ingress had softened the deck's marine plywood base, which reduced the effectiveness of the six stainless steel self tapping screws used to help fix the seat modules to the deck.

Following this incident the MAIB issued a Safety Bulletin (2/2007) in which the owners and operators of Ribquest RIBs were recommended to make the followings checks:

- Physically try to move the seats and consoles by hand to ensure there is no movement;
- Check for loose screws and/or evidence of any screw movement;

¹⁰ 'Notified bodies' are appointed, by EU member states to carry out the tasks pertaining to conformity assessment. The Commission publishes a list of notified bodies in the Official Journal of the European Communities.

- Examine the sealant between seat/consoles and the deck to check for breaks or cracks;
- Establish if there is any water seepage under the console/seat that may indicate the sealant is not fully attached;
- Where doubt exists, seek advice from a professional boat builder/repairer to ensure the seats/consoles have been attached in accordance with the manufacturer's guidance and remain secure.

1.16.2 Ribeye Open Tender 450

On 7 August 2005, a seat and console module detachment on board a 4.5m RIB in Abersoch, North Wales, resulted in a teenager being injured when he was struck by the RIB's propeller after being thrown overboard. In this instance the console module was not designed for, or compatible with, the hull of the RIB.

The MAIB investigation report recommended the BMF highlight to its members the importance of:

- Boat accessories being clearly labelled and supplied with fitting instructions;
- Checks by dealers to ensure compatibility between accessories and hulls;
- Fitting accessories in accordance with the manufacturer's instructions.

1.16.3 Big Yellow

On 26 August 2005 the 9.1m RIB *Big Yellow* suffered a hull failure. The MAIB investigation report recommended the Department for Trade and Industry (DTI) and Local Authority Coordinators of the Regulatory Services to:

- Advise officers of local authorities, in the interest of public safety, of the importance of conducting boat builders' RCD compliance checks, especially for those building under self assessment rules.

1.16.4 Breakaway 5

On 19 July 2003 the hire craft *Breakaway 5* capsized, resulting in one fatality. The MAIB investigation report recommended the BMF to:

- Encourage boat builders to arrange for an independent competent audit of their methods used to certify a boat's conformity with the essential requirements of the RCD.

And the Department for Trade and Industry (DTI) was recommended to:

- Re-examine the methods used to raise the awareness of the RCD among small boat builders, and to improve their understanding of the means of demonstrating compliance with its essential safety requirements.
- Ensure that relevant local authority trading standards departments are aware of their responsibilities as enforcement authorities with regard to the application of the Recreational Craft Regulations.

1.17 RCD TRAINING

The RCD is a legal document which, by design, is open to a certain degree of interpretation. The BMF has worked to promote the appreciation and understanding of the requirements and responsibilities set out in the Directive. It provides RCD awareness training to both its members and non-members alike, within the industry. It also issues literature designed to keep its members up to date on amendments to the Directive and any related harmonised standards. The majority of courses and seminars provided by the BMF encompass all types of recreational craft and are designed to maximise participation by appealing to all sectors of the industry. The Department for Business, Enterprise and Regulatory Reform (BERR), acting on previous recommendations from the MAIB, has supported RCD awareness programmes within local authority trading standards departments.

1.18 MARKET SURVEILLANCE

Within the UK, the Directive is implemented by the Recreational Craft Regulations 2004. BERR has the responsibility for these regulations, with market surveillance and enforcement being the responsibility of local authority trading standards departments. The market surveillance authorities within any EU member state can request copies of the documents held in the technical files. None of the companies involved in the manufacture and sale of *Partner 1* had received visits from, or sought the advice of trading standards officers.

Hampshire trading standards has produced a simplified and focussed recreational craft fact sheet to help local enforcement officers, across the UK, identify the key points of the Directive.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 THE DETACHMENT

It is evident that the detachment of the console module occurred because its securing arrangement was not sufficient to withstand the stresses experienced when manoeuvring at speed. The module was fixed to the hull by only four screws, of which only one had effectively penetrated the deck's plywood base. It is almost certain that the four screws were those fitted at the RIB-X factory in 2006 to enable the console and hull to be transported to the dealer. However, the presence of rubber gaskets under the steel washers, and silicone sealant between the console module landing flange and the deck panels strongly indicates that the module had been lifted and replaced at some time before the RIB was delivered in March 2008. It is not known when or by whom this work was undertaken.

2.3 RECOVERY OF THE INSTRUCTOR

In differing circumstances the consequences of detachment of the console from the deck of *Partner 1* could have been tragic. Fortunately, through good practice, effective training and the carriage and use of safety equipment, nobody was injured. The boat's owner had been extremely sensible in arranging an RYA powerboat course before operating the RIB by himself, and he and the other trainees had only just finished a series of manoverboard drills when the accident occurred. In addition, both the engine kill cord and the lifejackets worn by the instructor and helmsman operated as intended. The engine kill cord not only stopped the unguarded propeller from turning, it also prevented the RIB from running away, and therefore enabled the trainees to maintain contact with the instructor.

2.4 QUALITY MANAGEMENT

Given the console's securing arrangements and the ease with which it detached from the deck, it is apparent that the strength requirements set out in the standard (ISO 6185-3) had not been met and *Partner 1* had therefore been delivered to its owner in an unsafe condition. This was due to a number of factors, including:

- The console module was not fitted in accordance with the manufacturer's guidance
- The RIB was not returned to an authorised installer, as required by RIB-X, before entering service
- Neither Poole Boating Centre nor Holes Bay Marine held the RIB-X commissioning guide and were unaware of the specific console securing requirements for the XP510 RIB.
- The work order from Poole Boating Centre to Holes Bay Marine to fit the engine and steering was verbal, and the requirement to permanently secure the console module to the deck might have been overlooked.
- The craft was not thoroughly inspected prior to its delivery.

These factors clearly indicate a lack of quality management in the RIB's manufacture and sale. Despite RIB-X's intention that each of its boats would be checked by an approved installer before delivery to a customer, there were no written agreements with its dealerships to this effect. The company also took little or no action to ensure compliance with its intended procedure, which could easily have been achieved through the monitoring of its customer registration forms against the installations completed. Indeed, RIB-X did not take any action even after the examination of the second-hand RIB returned in 2006 identified a large number of deficiencies.

As the only approved installation centres available were at the RIB-X factory in Leicestershire and its dealership in Wales, it was not surprising that Poole Boating Centre elected to have four of the eight RIB-X boats it sold, including *Partner 1*, to be rigged locally through Holes Bay Marine. This practice saved a considerable amount of time, travelling and expense, and was also undertaken by other RIB-X dealers. Indeed, only one of the four RIBs rigged out by Holes Bay Marine appears to have had its console module secured, and that is unlikely to have been installed in accordance with RIB-X requirements. Furthermore, it is evident from the examinations of *Partner 1* and the RIB returned to RIB-X in 2006 that the work conducted on these craft by Holes Bay Marine not only fell short of the installation requirements of RIB-X, but several aspects also fell short of the standards normally expected within the marine industry.

2.5 APPLICATION OF THE RECREATIONAL CRAFT DIRECTIVE

It is the responsibility of a manufacturer, or its authorised representative within the EEA, to carry out the conformity assessment of the boats it is placing on the market and to ensure they meet the essential safety, health, environmental protection and consumer protection requirements of the Directive. As *Partner 1* was delivered to its owner in an unsafe condition, it is evident RIB-X did not fulfil these responsibilities.

In this case, although the builder's plate affixed to *Partner 1*, the XP510's technical file, and the sample declaration of conformity provided to the MAIB (**Annex J**) show that Falcon was the manufacturer, with RIB-X possibly acting as its authorised representative, there are a number of factors which indicate RIB-X was the boat's manufacturer. Notably, Falcon had not issued a written mandate, not all of the components used in the construction of the Explorer range were sourced from Falcon or its approved suppliers, RIB-X supplied the owner's manual and issued the manufacturer's warranty, the RIB was branded as a RIB-X510, and RIB-X advertised itself as the manufacturer.

Falcon is aware that the bare hulls it exports to the UK are used to construct RIB-X products. As such, they are partly completed boats and, in accordance with the Directive's requirements, should be accompanied by an Annex IIIa declaration; a CE marked builder's plate should not be affixed. Similarly, the craft RIB-X sell to its dealerships which are put on display and are not intended to be put into service before a significant amount of additional work has been carried out, must also be considered to be incomplete and follow the same process. **Annex K** illustrates a simplified interpretation of the documentation required at each point of transfer when following RIB-X business procedures. The builder's plate should not have been affixed to *Partner 1* until it had been completed and met the essential requirements of the RCD.

Although the RIB industry in the UK is different to many other recreational craft sectors in that craft are intentionally left incomplete with respect to the fitting of consoles, seats, engines and steering systems in order to meet customers' specific needs, there does not appear to be any reason, other than convenience, why CE marked builder's plates need to be affixed before a craft has been completed and is ready for service. A CE marked plate indicates that a craft meets the essential requirements of the RCD and is therefore safe to use. Where it is affixed before a craft's compliance has been verified, the potential for an unsafe product to reach the market is inevitably increased. The owners of new boats should not be expected to have to check the security of fixed items such as consoles and seats.

2.6 INDUSTRY AWARENESS

The RCD has been mandatory for 10 years, with the UK Recreational Craft Regulations being in force since 2004. It was inevitable that a period of time was needed for industry to become aware of, and implement, the requirements set out in the Directive. Indeed this was confirmed by the previous investigations referred to in Paragraph 1.16 which identified that the RCD was not widely understood, or adhered to, by the recreational craft industry or by trading standards departments. Consequently, a number of recommendations were made to try and address this deficiency. However, the departures from the RCD identified in Paragraph 2.5 together with RIB-X's failure to: undertake its own conformity assessments, issue declarations of conformity, maintain technical files, and produce its own CE marked builder's plates, indicates that the initiatives already implemented, including those made in response to MAIB recommendations, have not been effective.

The RCD is a complex piece of legislation and is open to interpretation, and although guidance documents have been produced to ensure a common interpretation across the EU and within the industry, they are detailed and are themselves complex and open to interpretation. It is therefore not surprising that a number of RIB manufacturers and dealers remain unsure of the requirements of the RCD and either apply them incorrectly or pay only lip-service to their adherence. The need to clarify the requirements of the RCD in a format which can be easily understood is compelling, and the probability of success of any further initiatives taken in this respect will be greater if the training and guidance provided is also focussed and relevant.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT WHICH HAVE RESULTED IN RECOMMENDATIONS

1. The detachment occurred because the console module was not adequately secured to the deck. [2.2]
2. The manufacturer's intended installation procedures were not followed. [2.4]
3. RIB-X did not effectively monitor the activities of its dealers and did not take active steps to prevent its products being put into service without having a pre-delivery inspection carried out by an authorised installer. [2.4]
4. *Partner 1* did not meet the essential requirements laid down in Article 3 of the RCD and was delivered to the customer and put in to service in an unsafe condition. [2.4]

3.2 OTHER SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION ALSO LEADING TO RECOMMENDATIONS

1. The work carried out by Holes Bay Marine on *Partner 1* prior to delivery not only fell short of the installation requirements of RIB-X, but several aspects also fell short of the standards normally expected within the marine industry. [2.4]
2. As the RIB's manufacturer, RIB-X did not meet its responsibilities with respect to the requirements of the RCD. [2.5]
3. A CE marked builder's plate was fitted to the hull of *Partner 1* before it had been completed and before its adherence to the essential requirements of the RCD had been verified. [2.5]
4. Other RIBs manufactured by RIB-X which have not been fitted out by approved installers might also be at risk of suffering a similar type of failure. [2.4]

3.3 SAFETY ISSUES IDENTIFIED DURING THE INVESTIGATION WHICH HAVE NOT RESULTED IN RECOMMENDATIONS BUT HAVE BEEN ADDRESSED

1. The initiatives and measures taken to date to improve the understanding and application of the RCD have not been effective. [2.6]
2. The need to clarify the requirements of the RCD and present them in a simple, easily understood format is compelling. [2.6]

SECTION 4 - ACTIONS TAKEN

The MAIB wrote to RIB-X on 13 May 2008 with the following recommendation:

2008/133 Accurately determine the number and locations of boats sold by dealers in the UK and Eire which have not been rigged and inspected by a RIB-X authorised representative prior to delivery and to check the standard of rigging on these hulls is at least equivalent to the standard detailed in the RIB-X commissioning guide, alerting owners to any deficiencies identified and any remedial action required.

RIB-X Ltd has:

- Written to the owners of the boats rigged out by Holes Bay Marine informing them of the situation and requesting they return their RIBs to the factory for examination (at the time of publication RIB-X had yet to receive feedback from two of the affected owners).
- Reminded its dealers of the procedures they are expected to follow when putting a partly completed boat into service.
- Undertaken to introduce procedures designed to ensure that builder's plates will not be affixed to its boats before they have been fully rigged by an approved installation's engineer.

The Department for Business Enterprise and Regulatory Reform (BERR) has:

- Undertaken to review the current guidance on the application of the RCD with a particular view to RIBs and other craft placed on the market in similar circumstances.
- Taken steps to facilitate action by the industry to address its practices to ensure that boats made available to consumers are safe.

The British Marine Federation (BMF) has:

- Published an article in its August 2008 technical report, making its members aware of this incident and reminding them of their obligations relating to the RCD.
- Has included the issues highlighted following this accident on the agenda of its Technical Committee meetings and Association meetings.
- Undertaken to design and make available tailored RCD workshops.
- Undertaken to discuss with its insurance, finance and broker membership issues raised following this and previous MAIB investigations. Methods designed to increase the awareness of the general public, such as, the possible inclusion of the RYA's publication *A Guide to Boat Purchasers* in the letters sent out to potential customers.

The Royal Yachting Association (RYA) has:

- Issued a bulletin to its powerboat instructors and training schools advising them of the incident and highlighting the potential for console and seat detachment.
- Written an article for its powerboat magazine advising its readers of the incident.

Powerboat Training UK has:

- Promulgated the circumstances of the incident to all its instructors and reminded them of the need to limit speeds to 20 – 25 knots and make slow wide turns during training courses.
- Emphasised the need for its instructors to carry hand-held VHF radios on their lifejackets and consider carrying a personal flare.

SECTION 5 - RECOMMENDATIONS

RIB-X Ltd is recommended to:

- 2008/179 Take immediate steps to complete the conformity assessment process for its full range of RIBs.
- 2008/180 Conduct a full review of its business activities and implement any changes that are required to:
- Ensure conformity with the essential requirements of the RCD
 - Improve the effectiveness of its quality management system to ensure that boats supplied to its customers are safe.

Holes Bay Marine is recommended to:

- 2008/181 Review its quality management system to ensure it conforms with industry best practice and it meets the installation standards required by manufacturers.

International Council of Marine Industry Associations is recommended to:

- 2008/182 Provide guidance to its membership on the requirements of the RCD, viz:
- Partly completed boats should be accompanied by an “Annex IIIa” declaration and not have a CE marked builder’s plate attached to the hull.

October 2008

Marine Accident Investigation Branch