Annex A

Syllabus for the RYA level 2 powerboat handling course

YOUR POWERBOAT CHECK LIST

Tell someone where you are going and when you plan to return, and inform them when you have returned.

Listen to the weather forecast
If in doubt, don't go out

Before going afloat check:
Personal and boat buoyancy
Alternative means of propulsion
Anchor, chain and warp
Bucket, bailer or bilge pump
Fuel, including reserve tank
First aid kit
Sharp knife
Engine emergency spares
Fire extinguisher
Flares as appropriate
VHF radio
Compass, electronic aids and charts when necessary
Car and trailer are properly parked

When afloat:
Keep a good look-out at all times
Don't overload your boat
Obey speed limits in harbours/estuaries etc.
Keep to the right in rivers/narrow channels
When crossing a channel, cross quickly at right angles
Keep clear of swimmers, fishermen, canoeists, dinghy sailors, windsurfers and boats/small buoys flying Code Flag A ('I have a diver down')
Think how your wash will affect others
Look out for deteriorating weather conditions

On the road:
Secure boat to trailer and stow all loose gear
Cover your propeller with a prop bag
Trailer lights must repeat those on the rear of the car, including a rear fog light if fitted to the car
Allow extra braking distance if your trailer is unbraked
Corner and reverse with care
Park your car and trailer clear of slipways and above the high-water mark
Use the correct number plate

Aim: To provide a practical introduction to boat handling and safety in powerboats. The course may be conducted in a variety of boat types, both planing and displacement, and the certificate issued will be endorsed to show the type of boat in which the training took place. The ratio of students to instructors should not exceed 3:1.
Duration: One day

Minimum age: Eight years old

Endorsements: Is aged 8–11 years and therefore should only use powered craft under the supervision of a responsible adult on board the craft

Is aged 12–16 years and therefore the holder should only use powered craft under the supervision of a responsible adult

Assistance required to complete the course

Section A: Practical Boat Handling

Launch and Recovery (8 to 11-year-olds to observe this session only)

Knowledge of:
- Considerations to be taken during the launch
- The use of a trailer or launching trolley
- Considerations to be taken regarding sea conditions and hazards
- Construction, width and condition of ramp/slipway

Preparation of Boat and Crew

Understands:
- Personal buoyancy and appropriate clothing
- The use of the following equipment: lines, fenders, anchor and warp, bailer, fire extinguisher, pump, paddles or oars, compass, flares, torch, whistle, charts, first aid kit, sharp knife.

Can:
- Perform the following: fasten to a cleat and stow an anchor

Boat Handling

Knowledge of:
- Planing boats: propeller angle and immersion, use of shallow drive
- Low-speed handling: ahead and astern
- Displacement boats: handling ahead and astern, carrying way in neutral

(Continued overleaf)

Understands:

- How to carry out pre-start checks, including fuel tank and fuel bulb
- Steering, controls and windage

Can:

- Steer and control boat speed
- Start and stop the engine
- Demonstrate the use of an appropriate length killcord at all times

Picking up and Securing to a Mooring Buoy

Knowledge of:

- Preparation of mooring warps
- Use of a boat hook
- Method of approach
- Crew communication
- Making fast

Leaving and Coming Alongside

Knowledge of:

- Wind effect
- Approach in tidal stream or current

Understands:

- Leaving – ahead or astern

Can:

- Demonstrate the use of painter, lines and fenders, attachment to boat, stowage under way
- Control speed and angle of approach
- Make fast alongside

Section B: Theory

Knowledge of:

- Loading and balancing the boat and the effect on handling and performance
- Local byelaws and insurance

Understands:

- Crew numbers: minimum number in the boat, keeping a look-out
- Awareness of other water users, including effect of wash
- Application of IRPCS. Understands rules 5, 6, and conduct around commercial shipping in confined waters

Man Overboard

Understands:

- How to stop the boat
- Raising the alarm
- Prevention

Essential Navigation and Seamanship

This course is great for those who have just completed their RYA Powerboat Level 2 or are preparing for a Powerboat Instructor Course and are looking to cruise locally in daylight.

Available online and in the classroom, this course gives you the essential knowledge needed when you're afloat. The topics include:

- Charts and publications
- Engine checks
- Tidal awareness
- Pilotage
- Anchoring
- Passage planning
- Safety
- Buoyage
- Visual and electronic navigation
- Rules of the road
- Weather forecasts

You will receive a course pack which includes a chart, plotter, dividers, course handbook, exercises and an electronic chart plotter CD.

How long is the course?

In the classroom, the course is taught over 16 hours with exercises to complete along the way. It can be covered as a series of short sessions or over two full days. Online, the course will take around six hours, but the beauty of it is that you can work through it at your own speed, whenever and wherever you like.

Taking the course online

Our online Essential Navigation and Seamanship course is run through recognised training centres using the RYA Interactive website. You can see more information and a 'taster' here: *www.ryainteractive.org*.

RYA Interactive courses can be taken any time, anywhere and at your own speed. All you need is a computer and the internet.

Aim: To teach boat handling and seamanship in powerboats. The course may be conducted in a variety of boat types, both planing and displacement, and the certificate issued will be endorsed to show the type of boat in which the training took place. The ratio of students to instructors should not exceed 3:1.

Duration: Two days

Minimum age: Twelve years old

Endorsement: Is aged 12–16 and therefore the holder should only use powered craft under the supervision of a responsible adult

Assistance required to complete the course

Section A: Practical

Launching and Recovery

Knowledge of:

- Use of a trailer or launching trolley
- Consideration of launching and sea conditions, including hazards and obstructions
- Number of persons required to launch/recover
- Construction, width and condition of slipway
- Steep/slippery slipways, beach launching, lee shores
- Care of trailer bearings, hitch, lashings, ties, lights and winch
- Trailer parking

Can:

- Prepare the boat, lines, fenders, safety equipment, fuel tanks, lines and secure gear on board
- Prepare to go afloat
- Tie relevant knots

Boat Handling

Knowledge of:

- Loading: effect on handling and performance, effect on balance and trim, CE Plate and manufacturer's recommendation
- Handling characteristics of displacement boats, rudder-steered craft and shaft-driven vessels

Understands:

- Crew members: minimum number in faster craft, keeping a look-out

(Continued overleaf)

- The importance of boat control in waves and adequate seating to minimise the possibility of back injury
- Awareness of other water users, including effect of wash
- Steering, controls, effect of current or tidal stream
- Handling a boat at planing speed, trim tabs and power trim
- Planing boats: propeller angle and immersion, shallow drive, planing and displacement speed handling, tiller/console steering

Can:

- Carry out pre-start checks, engine starting and stopping
- Demonstrate the use of an appropriate length killcord at all times
- Carry out low speed manoeuvres including: turning in a confined area, effect of wind on bow and holding off. Demonstrate an awareness of the danger of flooding when going astern
- Handle a boat at planing speed

Securing to a Buoy

Understands:

- Preparation of mooring warp
- Use of a boat hook
- Direction of approach
- Taking way off
- Crew communication
- Making fast
- Procedure when overshooting

Can:

- Approach and secure to buoy

Anchoring

Knowledge of:

- Types of anchor
- Stowage and attachment to boat
- Preparation of anchor, chain and warp
- Weighing anchor

Understands:

- Correct approach in various conditions
- Taking way off
- Crew communication
- Check holding
- Depth of water, holding ground, scope required

Can:

- Approach and anchor correctly
- Weigh anchor correctly

Leaving and Coming Alongside

Understands:

- Preparation and use of lines and fenders, attachment to boat, stowage under way
- Speed and angle of approach
- Wind effect
- Method of approach in tidal stream or current

Can:

- Make fast alongside
- Use springs
- Leave – ahead or astern

Man Overboard

Knowledge of:

- Recovery of man overboard

Understands:

- Cold shock and immersion hypothermia
- How and when to raise the alarm

Can:

- Take immediate action
- Observe the man overboard
- Carry out the correct return with awareness of propeller
- Approach and recover the 'man' in the water. (Small weighted buoy to be used)
- Demonstrate both drift down and into wind approach method
- Switch engine off

Section B: Theory

Knowledge of:

- Types of craft: advantages and disadvantages of different hull forms with respect to sea-keeping ability
- Seating arrangements
- Stepped hulls

(Continued overleaf)

- Engines and drives: advantages and disadvantages of outboard, inboard and outdrive units, single and twin-shaft drives, choice and use of fuels
- Siting of fuel tanks, fuel lines, batteries, wiring, fire extinguishers
- Routine engine maintenance checks, basic fault diagnosis
- Close down procedure
- Advice to inland drivers about coastal waters
- Use and limitations of GPS/chart plotters
- Application of local byelaws, especially around commercial shipping
- Sources of weather information

Understands:

- Awareness of other water users
- Communication with other craft
- Disabled craft
- Emergency action, preventing sinking
- Adrift – alternative means of propulsion
- Actions to be taken by a disabled craft and being towed
- Fire precautions and fire fighting
- Distress signals, means of issuing distress, DSC and the Mayday call
- Advice for vessels in restricted visibility

Can:

- Apply IRPCS, principally rules 5, 7, 8, 9, 12–18

Section C: Coastal

Knowledge of:

- Byelaws and local regulations
- Insurance
- Boat registration schemes

Understands:

- Pilotage and passage planning
- Charts, chart symbols, buoyage systems
- Tides and tidal streams

Can:

- Use steering and hand-bearing compasses
- Apply Section A on coastal waters

Section D: Direct Assessment for Experienced Powerboat Drivers

The candidate should have the equivalent of at least one full season's powerboat-handling experience.

The candidate must complete the practical exercise described overleaf, and satisfactorily answer questions on Section B.

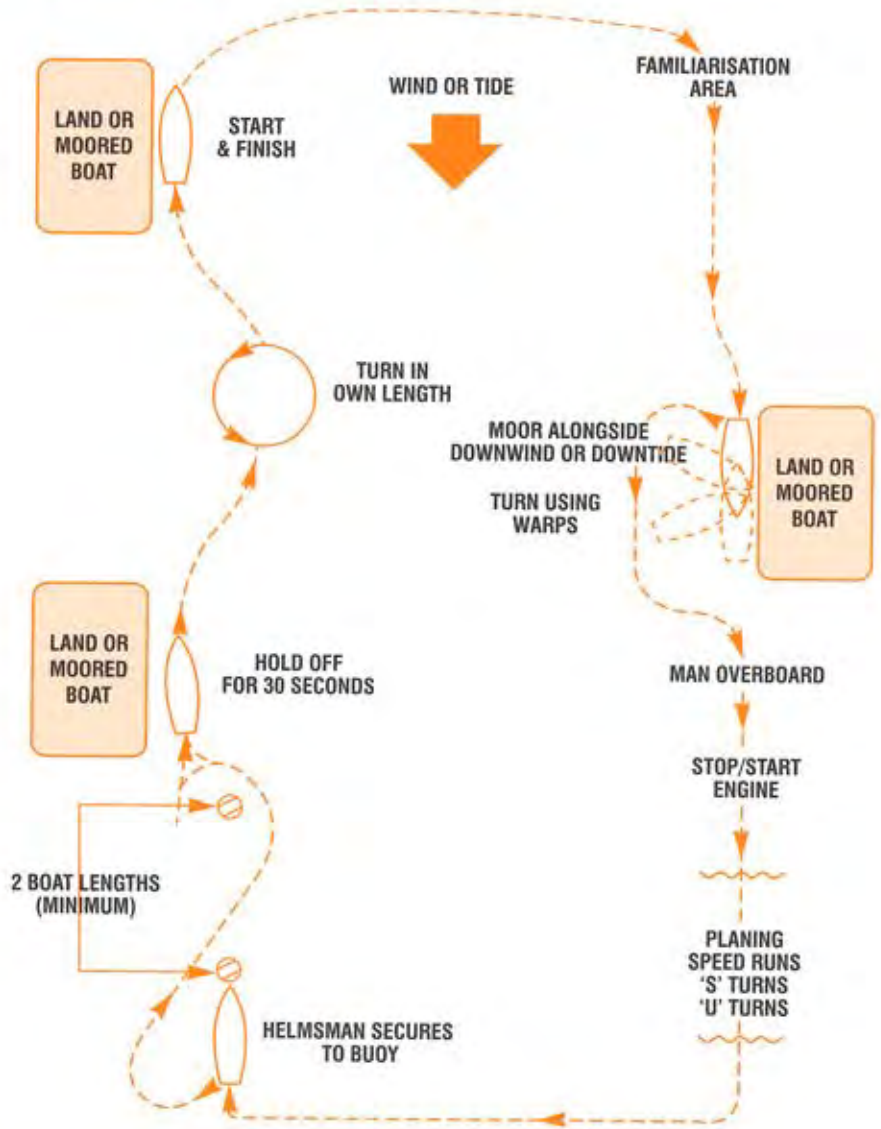
Candidates seeking assessment on coastal waters will demonstrate a knowledge and practical application of Section C.

Practical Assessment of all Candidates for Level 2

The practical exercise detailed in the diagram overleaf shows the manoeuvres required to be demonstrated during the practical assessment. Candidates are expected to show that they understand the principles of each manoeuvre. Failure to complete a manoeuvre successfully at the first attempt will not necessarily result in overall failure, but a timely awareness of the need to abort an exercise and try again is important.

(Level 2 test diagram overleaf)

National Powerboat Course Level 2 assessment



Day Skipper Shorebased

A perfect precursor to the RYA Intermediate Powerboat course, this is a must for those skippers thinking about cruising further afield or planning to take their boat on holiday. It equips you with enough knowledge to navigate familiar waters by day. A basic knowledge of lights is also included.

Delivered in the classroom or by distance learning, the topics covered include:

- The basics of seamanship
- Chartwork
- Position fixing
- Weather forecasting and meteorology
- Collision regulations
- Construction, parts and equipment of a cruising boat
- Essentials of coastal navigation and pilotage
- Electronic charts
- Plotting a course to steer
- Tides
- Emergency and safety procedures

Your student course pack includes a course handbook, charts, exercises and an electronic chart plotter CD.

How long is the course?

In the classroom, the course is taught over 40 hours, with two assessment papers. Some centres deliver the course as either a series of short sessions, an intensive week-long course, or by distance learning.

Milly – post-accident inspection report

Lorne Campbell Design Marine Craft Designers and Naval Architects

Lorne F Campbell, I.Eng, FRINA, MSNAME Website: www.lornecampbelldesign.com

Report for the M.A.I.B. on 8m Cobra RIB following Padstow accident on 5th May 2013:

This report is prepared at the request of the Marine Accident Investigation Branch (MAIB), Mounbatten House, Grosvenor Square, Southampton, SO15 2JU. It follows an inspection of the craft at the premises of the AAIB, Farnborough on Tuesday the 14th of May, 2013.

Instructions:

To look into the following areas and note anything else to do with boat and its condition which might be relevant:

- The set-up of the vessel, including the engine position
- The likely hydrodynamic properties of the hull
- Suitability and functionality of the engine in use
- Suitability and functionality of the steering
- Likely skill levels required to operate the boat safely
- Meaning and background to the RCD plate information

1. Relevant excerpts from witness and other, reports were given to the author:

h) Sea conditions were basically flat calm.

i) Engineers who inspected the 300 hp Yamaha outboard motor said they were satisfied that all the equipment was in satisfactory working order but that the electronics had recorded a very short duration (less than a second) engine over speed (to ~ 6500 rpm) at the time of the accident. Our own dry land inspection indicated that the steering was in satisfactory order, with minimum play.

2. Boat Design and Construction:

The boat was a Cobra, 8 metre RIB powered with a single 300 hp Yamaha outboard motor. A number of 8m Cobras have been produced and fitted with a single 300 hp outboard. The RCD Builder's Plate says that maximum power rating for that craft is 265 kW which is 355 hp.

a) The boat was on its own trailer and seemed to be in good condition. It is understood that the engine was about 18 months old; it, also, seemed in good condition. There was a small amount of abrasion on the leading edge of the skeg. This looked like the sort of mild damage that could be inflicted by dragging the skeg in the sand when trying to load the boat onto its trailer. It did not look as if it was recent damage as there seemed to be some mild corrosion present. It does not seem that this had any bearing on the accident.

b) The condition of the glass fibre or FRP structure looked to be good with no obvious abrasion or damage of the type that might be inflicted by impact with a hard object or sandbank, although it would be correct to check the state of the tide and the depth of water in the area of the accident at the relevant time. It is possible the trailer supports masked some areas so a recheck when the boat is lifted for weight checks would be advisable.

c) The finish of the hull moulding looked to be acceptable. The finish was of 'production' quality rather than the fine 'blueprinted' finish of, say, a race boat hull. This means that the edges of spray rails and transom corner had noticeable radii rather than being absolutely sharp. The bottom of the hull aft was checked with a straight edge and it was noted that there was a certain amount of concavity (referred to as 'hook') in the longitudinal surface. This amounted to approximately 3 mm on both Port and Starboard sides. Although not ideal, this is fairly common in non-racing boats and the author has seen worse.

d) Too much 'hook' in the aft sections of a planing hull can flatten the running trim by increasing the lift in the stern. This can then increase the tendency towards 'bow steer' which, in itself, can make the craft more liable to hook (an alternative colloquial meaning of the word 'hook') or spin (high speed broach) to one side or the other. This can be exaggerated if the longitudinal centre of gravity (LCG) of the craft is too far forward. Again, it is not thought that this amount of bottom concavity aft, in itself, had any bearing on the accident, although the craft should be test driven to

check for any handling deficiencies. The craft had been used by the family for some time and they had plenty of time to get used to its handling.

e) The tendency to broach or spin can be increased by the wrong adjustment of the engine trim position (known as 'power trim'). Hydraulic rams controlled by a dashboard switch can pivot the engine about a hinge at the top of the transom, thus the lower unit can be moved forward and aft which, in turn, can change the thrust line of the propeller from pointing down (looking aft) and, hence lifting the stern, through a neutral, horizontal, position to pointing up (again when looking aft) which depresses the stern. If the trim is too far 'in' which is when the propeller thrust is lifting the stern, the bow steer mentioned in d) above can be exaggerated, since the lifting of the stern depresses the bow and forces the forefoot into the water. This increases its sensitivity to being deflected to one side or the other by waves or washes which impinge from one side.

f) If, on the other hand, the power trim is too far 'out', the stern is depressed and the bow is lifted. This is the position for high speed in a straight line because the reduction in wetted bottom area reduces drag. If the trim adjustment is left in this position when the craft is turned there is reduced grip on the water and the craft can slide sideways. If the bow meets a wash or wave while the craft is sliding the bow can be slowed while the stern continues to slide which can, again, result in spinning the boat.

g) The actual position of the engine, from the power trim point of view, at the time of the accident, is unknown since the engine was tilted right up in order to get the boat on the trailer. The power trim adjustment was checked and was functioning correctly. The maximum 'in' position was not too pronounced – i.e. the stern lifting/bow depressing effect of full 'in' trim would not be overly great. Power trim position could, however, have had an effect on the handling. Trials of the craft should indicate how sensitive its handling is to the power trim position.

h) The noted engine over speed indicates that the propeller was lifted clear of the water at some stage during the accident with the throttle opened an appreciable amount. The only way an undamaged propeller/engine can over speed while still submerged is if cavitation is suddenly induced. This is unlikely to happen to a craft which is already running at some speed with the propeller biting. Modern fast craft propellers with cupped blades, are designed to run with a fair amount of air entrainment – since they are close to the surface – and, as such, are resistant to cavitation. It is more likely that the propeller was ventilated by being momentarily lifted clear, or almost clear, of the water.

i) It could not be ascertained whether there was any water trapped in the forward sections of the hull. If there was, it could have the effect of moving the LCG forward and increasing the possibility of bow steering/broaching. Again – trials should give an indication of this.

j) The hull deadrise (vee angle) was measured at ~ 23 degrees and is in the normal range for craft of this type. The average 'effective' deadrise – after taking into account the 'double chine' effect of the outer strake (outboard of the outer spray rail) – is reduced a little down to a figure of the order of 22 degrees, but this is still within the normal range.

k) It was noted that all the spray rails run right to the transom. This is normally good for added grip to the stern and increases directional stability.

l) The height positioning of the anti-cavitation/ventilation plate above the transom bottom edge, was of the order of 2.25 inches (57 mm). This is not excessive and allows a reasonable amount of immersion of the motor's lower unit and skeg which, in turn, should give reasonable lateral grip on the water (hence helping directional stability) under normal circumstances.

m) It was noted that the engine was offset to Starboard by ~ 50 mm. This is quite high for a non-racing boat, but, nevertheless it is not believed to have had a material effect on the accident. The normal reason for offset is that with right hand rotation of the single propeller there is a torque reaction which tries to rotate the hull of the boat over to Port. In a light weight racer the effect can be appreciable and cause the craft continually to land on its Port side when jumping in waves. With heavier leisure craft this effect is much less pronounced and, therefore, such offset is unusual.

n) A single right hand rotation propeller has a tendency to 'walk' to Starboard which tries to twist the motor to Starboard and put the boat into a Starboard turn. Outboard motor manufacturers fit an adjustable trim tab on the underside of the motor's cavitation plate, aft of the propeller, which can be adjusted to counter this propeller side thrust which is experienced on single engine installations. It was noticed that the tab was set in a central, fore and aft, position (used for twin counter rotating propeller installations) and had not been adjusted to counter the turning effect. This means that if there is no hand on the steering wheel, the craft would have a tendency to turn to Starboard. Hydraulic steering has a resistance to this but, nevertheless, the tendency is there. The other effect of

lack of trim tab adjustment is that the load on the wheel will be lighter when turning to Starboard, than when turning to Port.

o) The bow/forefoot is quite fine (sharp). Finer, deeper vee, bows are good for softening the ride in a head sea but, also, more prone to catching a wave from one side of the bow and being deflected to one side. A design compromise has to be reached, between flatter hard riding sections with better directional stability as against softer riding deeper sections which are more susceptible to deflection. The latter usually prevails, these days, and is alright provided the combination of all the other factors previously mentioned are not biasing the craft towards too flat a running trim.

p) The buoyant tube's lower sections aft are immersed at rest. If, when banked over during a high speed turn, the bottom of the inside tube touches the water, it can sometimes create lift aft which raises the stern and causes it to lose lateral grip. Alternatively, the round sections of the tube can suck the craft over into a steeper bank and this, again, can cause the apparent deadrise of the inner bottom to flatten out – again losing lateral grip aft. An earlier 8.5 metre version of this craft, powered with a 350 hp outboard, was criticised in a test report for lacking grip at the stern during fast turns and, while it is not correct to say, automatically, that the 8m RIB being investigated will have the same problem, controlled trials are needed to check for this tendency.

q) The bottom panel just inboard of the main hull chine finishes at its inner edge at a horizontal flat which is like the flat of a spray rail but which, unlike a normal spray rail, does not have a ~ 90 degree corner at its outboard edge. This could mean that water/spray does not separate at its outboard edge but travels round the corner onto the outer panel. This can create low pressure (suction) similar to that described for the tube in 2a) above, with the same possible consequences.

3. Conclusions on the boat design and construction, so far:

Despite the notes above, it is not thought, at this stage, that there is any inherent problem with the boat itself that could have caused the accident. There are the following provisos:

a) That all the above possible set up problems such as water in the bow, LCG position, Power Trim position, hull design, etc, have not combined to make the craft prone to bow steering.

b) In light of the possibilities mentioned in a) above, it is requested that the longitudinal position of the centre of gravity (LCG) is measured by hanging the craft in a single sling from a crane. If a craft weight could be ascertained at the same time, that would be useful.

c) It is also necessary to have an expert coxswain drive the craft – in the relevant load condition – to give feedback on the feel and handling.

d) Despite there being no obvious evidence of an impact to the hull, the possibility of the craft hitting a sandbank at the time of the accident, should be ascertained by consultation with the harbour authorities at Padstow.

4. Thoughts and Preliminary Conclusions, with the evidence thus far, on the mechanism of the accident:

5. Further action required:

a) Lifting of the boat in a single sling to ascertain the Longitudinal Centre of Gravity (LCD) position.

b) Ascertaining the craft weight.

c) Trials of the craft involved under controlled conditions, in order to check out the handling of the craft under various (relevant) loading and trim conditions to check whether there is anything built in to its design/handling that might lead to the above projected scenario.

d) Checking via the Padstow maritime authorities to see if there was any likelihood of the craft hitting an object or sandbank at the time of the accident. Inspection did not show up any hull/propeller damage that a grounding/solid object impact would be likely to cause, but lifting the hull clear of the trailer would allow a better inspection.

L.F.C. 28.05.13

APPENDIX:

Note on the RCD Builder's Plate:

It was noted that the fitted plate consisted of a perfectly acceptable printed aluminium alloy plate of standard company construction, which was then supposed to be marked with the appropriate parameters for the particular craft it was fitted to. The plate itself was very legible, but the actual individual numbers had been scratched on in amateur fashion, seemingly by using a nail or pin. The numbers were only just legible and could have been scratched on by anyone. Although there is no reason to suppose that the numbers are not genuine, they could easily not be. These numbers should be indented using a hammer and number punch – not too much to expect from a manufacturer – so that they are much more permanent and professional looking. This plate is not acceptable in my opinion.

PHOTOS ATTACHED:

a) Trim Tab

b) Skeg Abrasion

c) Cavitation Plate Height (and indication of Starboard offset)

d) RCD Builder's Plate

e) Shape of outer hull bottom panel


APV Marine Ltd
Romsey UK Tel: +44 (0) 1794 400995
Category
Max
kg
Max
kg
Max
kW
Max
0.15
bar
EN ISO
Type
WARNING: QUALIFIED OPERATOR TO BE IN CONTROL AT ALL TIMES. BOAT STABILITY AND HANDLING WILL CHANGE WITH TOTAL LOAD, WEIGHT DISTRIBUTION AND SPEED.

Milly – trials report

Lorne Campbell Design Marine Craft Designers and Naval Architects

Lorne F Campbell, I.Eng, FRINA, MSNAME E-mail: [redacted]
Website: www.lornecampbelldesign.com

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Report on Trials of 8m Cobra RIB, 'Milly', conducted at the Weymouth & Portland National Sailing Academy, Portland on Tuesday, June 18th.

Trials were conducted by the Marine Accident Investigation Branch (MAIB) with various MAIB members and other relevant parties present.

Date of Report: 16th July 2013

Craft Data:

i) Cobra 8 metre RIB powered by a single Yamaha Outboard Motor.

ii) Hull Deadrise: Nominally 23 deg. on bottom skin, but effective overall deadrise is ~ 21.75 deg. taking into account the slightly unconventional outer strake panel just inboard of chine.

iii) Hull length – Bow tube forward face to heel of transom: ~ 7.12 metres

iv) Chine Beam: ~ 1.98 metres

v) Power: 300 shp at 5500 rpm (Full throttle range: 5000 – 6000 rpm).

vi) Gear Ratio: 1.75:1

vii) Propeller: Yamaha 15.25" x 19"T x 3 blade, stainless steel.

viii) Engine offset to Starboard by ~ 48 mm and cavitation plate height set at ~ 57 mm up from hull bottom.

ix) Weight at start of trial: ~ 2270 kg (including crew fuel and ballast).

x) LCG at trial calculated from actual weighing + adding two adults at helm position: ~ 2.222 m forward of transom heel (see Appendix 3). Calculated hull angle of attack at 46 knots = 2.5 degrees.

xi) LCG (approx.) after forward ballast of 120 kg was moved to the aft bench seat position: ~ 1.96 m ref transom heel – this is an aft LCG shift of ~ 260 mm, which is significant. Calculated hull angle of attack = 2.8 degrees – an increase of ~ 0.3 degrees over x) above.

xii) Static trim (angle of attack) at start of trial: ~ 0.6 degrees by the stern.

xiii) Maximum speed recorded by crew during trials: 46.2 knots at 5800 rpm (nominal prop slip = 10.8%).

Craft setup for trials:

A. Three fixed video cameras were fitted one pointing aft fitted at the stern; one pointing forward behind driver and co-driver; one on the bow pointing forward. The trials were also filmed by hand held camera from the support boat.

B. The craft was fitted with data logging kit supplied and operated by the Wolfson Unit. The results from this data collection will be issued in a separate report.

C. The craft was balanced and weighted as closely as possible to its condition at the time of the accident. Fuel was approximately correct, ballast to equate to the forward passengers was fitted under the forward lockers beneath the relevant seat cushions, and there were two adults at the helm position.

Format of Trials:

1. A formal trials sheet was produced and this was broadly followed during the day's proceedings – See Appendices 1 and 2.

2. Trials took the form of a gentle start to the proceedings while [redacted] acclimatised himself to the craft's general handling characteristics. This included runs outside Portland Harbour (Test 1) in more open sea conditions showing how the boat generally handled less than flat calm water.

3. Tests 2 consisted of straight line runs in flat water conditions inside the harbour with steadily increasing speeds. During these runs the engine power trim (which adjusts the angle of the outboard motor and, hence, the propeller thrust line angle) was adjusted from full 'trim in' – i.e. motor leg tucked towards transom as far as it will go – through 'neutral' where the propeller thrust line is close to parallel with the keel, to a reasonable 'out trim' which it was estimated could approximately correspond with a trim setting for maximum speed, to a more extreme 'out trim' which may be less optimal but needed to be tried to assess the boats reaction to this, more extreme, setting. It was noted that if trimmed out too far, the boat had a slight tendency to 'porpoise' – a rhythmic pitching motion – but that there was no advantage in boat performance in using this excessive out trim setting; propeller slip increased and boat performance fell off. This is not unusual for such planing craft.

4. Power trim position was indicated on the gauge, by a numbering system, with full 'in trim' corresponding to 0 (zero). 18 corresponded to approximate 'neutral' trim, 30 was what could be termed 'half out' and ~ 42 was an estimated maximum workable 'out trim' which was likely to be further out than comfortable. In the event, it was noted during trials that a setting of 30-32 seemed to be optimum for best speed in calm conditions.

5. It should be noted that 'trimming in' has a tendency to lift the stern and depress the bow, while 'trimming out' does the opposite. Thus, 'trimming in' reduces the angle of attack of the hull and places more of the forward length of the keel in the water. This increase of forward wetted surface, moves the 'pivot point', about which the hull steers, further forward and increases the distance between the outboard motor (with the stabilising rudder effect of the motor skeg, aft) and the pivot point. Thus, the boat has reduced straight line (directional) stability and is more easily turned.

6. The driver did say that with 'in trim' the bow felt as if it was 'riding harder' on the water and the directional stability felt reduced.

7. It was also noted that when turning at each end of the straight line runs to position for the return run, that the boat did take up a high angle of inward heel – towards the more extreme end of the scale for planing deep vee craft – and, also, that this could happen in two stages – a certain angle of heel at the start of turning and then an increase to a more extreme angle part way through the turn. This is not unknown and some other craft have exhibited this tendency, but it is preferable to engineer it out.

8. By the studying of photographs taken at the time of the accident, an engine trim position had been estimated. This was slightly tucked in from neutral and corresponded to approximately 10 – 12 using the above system.

9. Test 3, consisting of hard acceleration and instant throttle shut off, did not show anything untoward.

10. Similarly, Test 4, crossing the wash of the support boat at 90 degrees using 4 predetermined trim settings, did not show any poor handling traits.

11. Test 5, was the same as Test 4, but crossing the wash at an angle of ~ 45 degrees. This, again, did not show up any particular negative aspects.

12. The gentle 'S' turns of Test 6 at the 4 trim settings, showed no problems.

13. Tests 7 – 11 were all turning tests of varying descriptions (See **Appendix 1**), and these did show up the handling trait mentioned in paragraph 7, that may have a bearing on the accident. Although these are different tests, they all, at some point, involved reasonably tight turns at medium to high speeds, and the noted tendency was the same in each case, so they will not be reported, here, individually. All these tests will be covered by the following notes:

14. Turns were conducted at speeds of 30-35 knots – touching ~ 40 knots on occasion.

15. When executing the turns mentioned above, the craft, initially, would take up a high heel angle. It would proceed to turn, but if the speed was slightly higher than a particular threshold and the turn tighter than a certain degree, the heel angle would increase during the turn, and the aft end of the hull would lose grip and slide – thus initiating a 'partial spin' or 'hook', since the bow did not slide by the same amount. Another colloquial expression to describe this behaviour is 'side dump'. As stated before, this is not an unknown trait, and a boat will show, one way or another, that it has been pushed to its limit. Some will 'let go' in a more benign way, however.

16. This rapidly took the craft to a position which was appreciably diverted from its original course. The craft would execute a sideways slide/skip and suddenly grip when it landed. Thus, the hull's sideways motion was suddenly stopped but the passengers continued in that direction under their own momentum. The effect was that, relative to the boat, they were thrown violently to the side. Also, since the sudden grip was applied at the keel, the craft would violently roll upright from its banked attitude, thus exaggerating the effect of being thrown to the side. During the trials the crew were prepared for this behaviour, were properly seated and were holding on tight to handholds so nothing untoward resulted (it should be noted that the 'kill cord' was attached to the driver). Also, the speed was kept down enough to give a margin of safety. The conditions were 'controlled'.

17. The test driver stated that, even though they were prepared, it was his opinion that another 5 knots speed during the above turning tests, would have resulted in them being thrown out of the craft.

18. It was noted that on these occasions the engine rpm would increase dramatically, thus indicating that the heel was so great, the propeller was losing grip on the water.

19. It is believed that the above scenario – the effect possibly increased in conjunction with encountering a wash (not necessarily a particularly noticeable one) on the Port bow – was the basis for the accident.

Suggested Mechanism of the Accident:

20. The craft planes at an acceptable trim angle but the forefoot is always in contact with the water surface. This, coupled with the relatively high deadrise forward compared with the low-ish (for a deep vee) deadrise of ~ 22 deg aft, means that if, at any stage, the stern is lifted a little and the bow drops into a wave of some sort, the lateral pivot point could move forward rapidly. Having the motor 'trimmed in' too far can increase this tendency.

21. The above is an observation, rather than a criticism. Hull design is a compromise and the advantage of the above proportions would be an improved straight line ride head to sea.

22. As close as can be ascertained, the accident happened in calm conditions while the craft was running at a good planing speed and taking a turn to Starboard.

23. It is known that the driver of the craft had taken the controls while in the passenger seat position (to Port at the console) while the correct driving position was on the Starboard side. Thus, his ability to use the controls with finesse were probably compromised.

24. During the trials it was noted that at intermediate to fast speeds during relatively tight turns the craft, which takes up a relatively high heel angle (estimated at ~ 25 – 30 deg. – from observation of the video footage) could suddenly increase heel (to an estimated 35 – 40 degrees) whereupon the stern would slide away and the craft would start to spin. It is significant that this apparent heel is greater than the hull deadrise angle – i.e. in a starboard turn the keel is higher than the Starboard chine!

25. It should be noted that, in virtually all planing craft of this type, the hull angle of attack reduces during turns. This is because the stern of the craft is running at higher speed relative to the bow due to the stern having to cover a larger radius arc in the same time. This means that stern lift increases and bow lift reduces.

26. In the scenario of 24 and 25, above, it could be seen from the video footage (See **Appendix 4** notes) that the whole length of the keel was lifted significantly above the water surface and the craft was planing on the hull bottom portion on the inside of the turn (i.e. the heel angle was significantly higher than the hull deadrise) – that is to say that in a Starboard turn the hull was planing on the starboard half of the Starboard bottom skin.

27. Needless to say, this is only a momentarily sustainable position. The craft is now, effectively, planing sideways on a very short, wide surface. This, like a high aspect ratio aircraft wing (i.e. glider with long slender wings) gives a lot of lift, so the craft rises and the wetted surface shortens towards the chine on the inside of the turn. Once – say, in a Starboard turn where the stern is sliding to Port – the centre of this planing lift moves past the Centre of Gravity (CG) position (i.e. to Starboard of it – towards the chine on the inside of the turn), then what is effectively a sideways 'porpoise' occurs. The craft CG being to Port of the centre of pressure of the remaining wetted surface, causes a moment that rolls the craft back to Port and, at the same time, the hull has risen virtually clear of the water. So, the

hull 'skips' sideways and rolls upright at the same time, whereupon, on landing, the keel bites into the water and abruptly stops the sideways slide. This happens with varying degrees of violence!

28. In theory – and it was found in practice – the further forward the CG is positioned, the lower the speed at which this scenario occurs. The aft CG position – i.e. with the passengers on the aft bench seat rather than on the bow seats – makes for a more directionally stable craft, which runs at a higher angle of attack. See '**Craft Data'** above.

29. It is possible that, on the occasion of the accident, the remains of a wake, coming in from the Port bow, was encountered. If this was the case, and when sliding, as described above in 26 and 27, the hull was sliding over one of the swells of the wake, then the violence of the manoeuvre when the keel bit back into the water could well be significantly increased, if the keel bit into the side of the next, parallel wake. The amplitude of the roll to Port – from being banked hard over to Starboard – would also be increased; it would roll upright, or possibly even some distance over to Port.

30. The other, further possibility – depending on the angle at which the possible wake was encountered – is that, on landing, the keel towards the forward end of the craft bit first. This would increase the angle through which the boat spun (in yaw – as viewed from above) before the abrupt stoppage, and may also add to the Port roll. If, at the point of the stern break away, the bow bit into the first wave of the wake, then the spinning moment in yaw would be increased and the craft would spin through a larger angle before landing (i.e. it would land more 'sideways') – again, increasing the violence of the incident.

31. If the boat slides, half spins and then violently stops, or dives off at 45 degrees or more to its original course, the crew and passengers will try to continue in their original direction under their own momentum. If, as seems to be the case, they were not expecting the above scenario, they are likely not to have been holding on, and, since the boat was yawed to Starboard, it would have seemed that they all went over the Port side. The violence of such a scenario can easily mean that 'holding on' is not enough, anyway. During the trials, the experienced crew were expecting the manoeuvre, were well located, and they were also probably travelling a little slower. They could feel the tendency towards the above manoeuvre and so kept below the point of no return.

32. None of the people on board were well positioned. Thus when the violent manoeuvre came they were all taken by surprise.

Conclusions/Notes:

33. The craft in question did not seem to show any untoward bad handling characteristics, although the banking, tail sliding and side skip aspect described above, when the craft reaches its limit in that type of manoeuvre, was noted.

34. It is felt that it would be nice to develop out the above characteristic from the craft, or reduce it. Although it has been known for other craft to exhibit similar behaviour, it is undesirable and it should be possible to reduce the effect – or the suddenness of it. Reducing the degree of heel angle, would help.

35. We should ask ourselves what causes the high heel angle described above. This is difficult to pinpoint. It could be the moment (leverage) between the low down side thrust of the propeller (when turned to one side) about the centre of gravity, not being overcome by the dynamic righting moment of the craft's hull until the high angle is reached (and/or the thrust is reduced by the prop losing grip), but since the proportions of the hull are not unusual it is conjectured that either the round tube or the unusual outer panel of the hull (just inboard of the chine) are picking up water by 'Coander Effect' (the force exerted by water sticking to, and being drawn round, a curved surface) which is actually sucking the hull over beyond its natural banking angle. If this is the case, then it should be possible that hull modifications/additions could be fitted which would separate the flow and break this suction. It is recommended that the company makes some effort towards this end.

36. It should be said, however, that owner's/driver's should learn the foibles of their craft. Once the character is known then the craft can be driven accordingly and allowance made. Cars behave differently from each other, and the same is true of boats. Waterborne conditions vary much more than those on the road so more expertise is required.

37. It is considered poor practice to drive a craft at speed with passengers loose at the forward end of the craft. Not only are the motions in that area more violent than those at the helm position but the centre of gravity of the craft is moved forward which can be detrimental to directional stability.

38. It is concluded that the craft was travelling at a speed of circa 35 – 40 knots, at the time of the accident and a turn to Starboard was being executed.

38. It is thought that the accident was caused by the following combined circumstances: The driver's lack of familiarity with the hull's handling characteristics at the limit; lack of preparedness of all those on board; poor personal positioning and control by the driver; the location of passengers forward rather than in the aft cockpit – described above under **'Suggested Mechanism of the Accident'**. It is possible that no wake of another craft was encountered, but the mechanism remains the same, even so. A wake could have exaggerated the effect and need not have been large or particularly noticeable.

39. At even higher speeds and, hence, less tight turns, the craft didn't heel so far and the problem of the stern sliding away, did not arise. So, it is a function of a mid range speed window and the degree of helm applied.

Appendix 1:

Preliminary MAIB test list.

1- Run for 10-20mins for a general feel in open water outside of the confines of the harbour

2- Conduct progressive straight line speed runs in flat water, working through the speed range of 20, 30, 40, 50 knots or the max speed attainable. At each 10 knot speed increment note the effect on the boats handling of 4 trim levels (1 = Trimmed all the way in, 2 = Level trim, 3 = Trimmed out position one, 4 = Trimmed out position two. Note engine RPMs at each speed.

3- Full throttle acceleration test using appropriate trim throughout plus High speed back off test.

4- Straight line high speed run @estimated speed of accident with wash from crossing support boat approaching straight to bow at 4 pre-determined trim levels

5- Straight line high speed run @estimated speed of accident with angled wash from crossing support boat at 4 pre-determined trim levels

6- High speed run @estimated speed of accident adding gentle course changes at the 4 pre-determined trim levels

7- Circle (Port and starboard rotations approx. 30m diameter) at increasing speeds from planing and note handling characteristics. Note effect of crossing own wash whilst circling looking for signs of hooking or exaggerated changes in roll, skipping, tripping or healing outwards.

8- Simulate 90 degree turns, ideally around a turn mark, starting from 20 knots building in 5 knot increments or less, with the 4 pre-determined trim settings.

9- Simulate 180 degree turns, ideally around a turn mark, at various speeds, with the 4 pre-determined trim settings

10- Simulate the accident with oval laps at progressive speeds from 20 knots in 5 knot increments (or less) and the 4 pre-determined trim settings.

11- Simulate the accident with oval laps at progressive speeds from 20 knots in 5 knot increments (or less) and the 4 pre-determined trim settings with the support boat wash approaching at the predicted angle of the event.

12- 10 - 20 minute rough water test, weather permitting, to experience boat handling characteristics in different sea states.

General driver test Notes

Ergonomics

Note general helm and console ergonomics whilst driving. Note throttle & trim operation and throttle stiffness (how easily knocked up or down). Note steering operation & feel and if any apparent steering torque.

Boat handling general

Look for any unusual or exaggerated characteristics as follows

1- In Pitch - Kiting, porpoising, overly soft, high or low trim.

2- In Roll - Chine walking or instability. Check static stability (Heel test)

3- In Direction – Directional stability issues, in particular, moderate to high speed turning characteristics. Look for any indications of bow steering or hooking tendencies. Note effect of encountering boat washes at various speeds and trim. Look for signs of side skip, trip and hook.

Note reaction to helm inputs, plus input required from helmsman.

Note reaction to Trim and throttle in a variety of conditions.

Note general ride and handling. Mother describes hitting brick wall, possibly as a result of hitting a wash, or the effect created with a sudden hooking of the bow which can create a violent change of direction.

Boat test condition

Proposed test site Portland harbour. Ideally calm or light wind conditions to simulate event.

To simulate loading at time of incident the boat will be ballasted with 120kg in bow V bench seat lockers using sand or ballast bags, consider inserting ballast bags into 1 tonne bulk bag or similar larger bag for protection from splitting. Fuel loading shall remain as is to most accurately represent the incident but recommend regular top ups, perhaps every 50 litres burnt.

Format will be to conduct each test run and relay the information after each test to the support boat/ ground team either by radio, phone or by verbally coming alongside (TBC). A record of speed, rpm and trim will be logged on board the test boat.

Appendix 2:

Boat make & model ……

Test conditions ……

Test 2

Conduct progressive straight line speed runs in flat water with 4 levels of trim, working through the speed range through to the maximum attainable speed. Note RPMs at the various speeds and handling characteristics.

Rating: 1 - 4 (Poor - Average - Good – Excellent)

Test Result @ 20 knots	**Engine RPM**	**Stability In Roll**	**Stability In Pitch**	**Stability In Direction**	**Notes**
Trim level 1					
Trim level 2					
Trim level 3					
Trim level 4					
Test Result @ 30 knots	**Engine RPM**	**Stability In Roll**	**Stability In Pitch**	**Stability In Direction**	**Notes**
Trim level 1					
Trim level 2					
Trim level 3					
Trim level 4					
Test Result @ 40 knots	**Engine RPM**	**Stability In Roll**	**Stability In Pitch**	**Stability In Direction**	**Notes**
Trim level 1					
Trim level 2					
Trim level 3					
Trim level 4					
Test Result @ 50 knots or max attainable	**Engine RPM**	**Stability In Roll**	**Stability In Pitch**	**Stability In Direction**	**Notes**
Trim level 1					
Trim level 2					
Trim level 3					
Trim level 4					

Max Speed achieved	

Notes:

Appendix 3:

Copy of Emailed results of pre-trial craft weighing on 12.06.13:

These are the results from yesterdays weighing of the Cobra RIB, Milly:

With added weight forward and at, seemingly, 78% fuel (correct me if I'm wrong, . I didn't write this down), the boat weighed 2.127 tonnes. This is the mean of three weighings: 2.14, 2.12, and 2.12. The LCG in this condition measured at 2170 mm forward of Heel of transom. If two adults, with a total weight of 143 kg, are added at the helm position (~ 3 m forward of heel), the LCG as at the event is ~ 2.222 m forward of the heel of the transom and the displacement is 2270 kg.

The working hull length of the craft (Heel of transom to forward face of tube) was measured at ~7.118 metres at Farnborough, so the LCG is 31.2% of this length forward of heel. Referencing other craft this should give a slightly stern down trim at static. An actual computer model of the hull could be used to give a more accurate static trim estimate and we did note that the bow of this craft is quite fine. Also, of course, some draught/freeboard measurements could be taken at the beginning of the trials. This is a reasonable working LCG position, towards the

forward end of the tolerable envelope but still within it. The LCG is not unusually far forward and it is suspected that a number of leisure craft run with LCGs in a similar position. Still – some craft are more susceptible than others to bow steering, so this still needs checking at the trials.

Engine trim position: If trim gauge is zeroed at 'fully in' (i.e. gauge registers 0) then 'level trim' is ~ 18; half out is ~ 30 and it is estimated that a practical full out figure would be ~ 42 – although you could go out to 50 or so (but that looks a long way).

By comparing the line of the stripes on the cowling with the rubbing strip on the tube in the supplied photos, it was estimated that the engine trim was set at ~ 10 or 12, i.e. slight tucked in from 'level'.
I will do some approximate running trim estimates based on the figures we now have.

Lorne Campbell Design
[redacted]
www.lornecampbelldesign.com

Appendix 4:

Review of trials video footage:

All the trials video was assessed and the following particular sequences were useful and of interest:

A. Afternoon/Engine (rear facing) camera/ 0001: It could be seen that during the slide/spin situation that the whole width of the wash area behind the transom, turned to white spray and the engine could be heard to over rev as the propeller lost grip.

B. Afternoon/Driver camera/ 0002: At ~23 minutes in: High heel; half spin; rpm increase.
With forward ballast moved to aft bench seat, the heel seems to be a little less. Driver said that the speed threshold for the stern loosing grip had increased. By observation of film, at ~ 30 deg. Heel there is no problem, but at ~ 40 deg. the stern lets go.

C. Afternoon/Bow camera/ 0002: At ~23 minutes,~ 24 minutes and ~ 26m-50sec: Part spins, engine rpm increase, boat suddenly 'standing up'. Driver mentions 'falling on the tube'.

D. Hand held camera/ 0013: At 5m-30sec and 6m-20sec, good views of hook/half spin (sideways 'porpoise'). Also at 9m-09 sec – hull is planing on the inside bottom and inside tube – then bow drops and it bites in.

E. Hand held camera/ 0014: At 3m-20s Another hook (to Port) – Keel clear of surface. The hull certainly gives the impression of being 'sucked' over, although the thrust of the turned propeller (at this angle, there is a large component of up thrust) will also be heeling and lifting the hull.

F. Hand held camera/ 0016: At 5m-30s and 5m-42s – more examples of high heel and hooking. Heel is more than deadrise; inside tube well in contact with water; planing sideways on bottom skin on inside of turn. After 120 kg ballast moved from forward seats to aft bench seat, the speed at which this happened increased. More at 9m-00s.

G. Morning/Engine/0004: At 1hr.00m.34s Side dump / hook. You can hear engine rpm rise.

H. Morning/Driver/0004: At 59m.30s approx. onwards there are some sliding/hooking shots. You can tell that the stern is about to let go by the angle of heel shown by the camera. At higher speeds and larger radius turns it doesn't happen.

I. Morning/Driver/0005: At approx. 10m-20s, side dump / hook. Can see that bow is lower and heel is ~ 40 deg. It is noted, for interest,only, that the hull wanders from side to side when running at displacement speeds (not unusual but not all craft are susceptible to this).

J. Morning/Bow/0003: Right at the end, it may be showing the porpoising tendency (motor trimmed out).

K. Morning/Bow/0004: At 59m-15s: Side dumps at heel of 35-40deg. Approx. 5 degree increase in heel and stern breaks away.

Annex D

Milly – trials programme

RIB Trials programme.

Portland Harbour 18 June 2013. HW 1418 1.4m

Run Number

1- Run for 10-20mins for a general feel in open water outside of the confines of the harbour

2- Conduct progressive straight line speed runs in flat water, working through the speed range of 20, 30, 40, 50 knots or the max speed attainable. At each 10 knot speed increment note the effect on the boats handling of 4 trim levels (1 = Trimmed all the way in, 2 = Level trim, 3 = Trimmed out position one, 4 = Trimmed out position two. Note engine RPMs at each speed.

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5- Straight line high speed run @estimated speed of accident with angled wash from crossing support boat at 4 pre-determined trim levels

6- High speed run @estimated speed of accident adding gentle course changes at the 4 pre-determined trim levels

7- Circle (Port and starboard rotations approx. 30m diameter) at increasing speeds from planing and note handling characteristics. Note effect of crossing own wash whilst circling looking for signs of hooking or exaggerated changes in roll, skipping, tripping or healing outwards.

8- Simulate 90 degree turns, ideally around a turn mark, starting from 20 knots building in 5 knot increments or less, with the 4 pre-determined trim settings.

9- Simulate 180 degree turns, ideally around a turn mark, at various speeds, with the 4 pre-determined trim settings

10- oval laps at progressive speeds from 20 knots in 5 knot increments (or less) and the 4 pre-determined trim settings.

11- oval laps at progressive speeds from 20 knots in 5 knot increments (or less) and the 4 pre-determined trim settings with the support boat wash approaching at the predicted angle of the event.

12- 10 - 20 minute rough water test, weather permitting, to experience boat handling characteristics in different sea states.

Cobra 8.5m boat test article RIB International magazine

Cobra

8.6 Nautique/Yamaha 350hp

The Cobra was one of the very first RIBs in the UK to offer customers the advantages of a rigid inflatable coupled to the interior of a traditional sports boat. Does the 2008 version of the Cobra 'Nautique' still deliver in terms of its sporting, offshore formula, against the backdrop of the current marketplace?

The Cobra Nautique range has been around for quite a few years now, proving very popular since their inception, and throughout their long production run the craft have benefited from a number of improvements. What is obvious is the superior quality of the mouldings and upholstery, and there is no doubting the attractiveness of the craft, but it is the build integrity that has really moved forward. Importantly, the structure of the craft has been made stronger without adding extra weight, and this has led to a much stiffer craft when underway, especially when travelling at speed in a choppy sea.

When the first Nautique arrived on the RIB scene in the early 90s, I had the opportunity of sampling a couple of these craft and remember how clever and comfortable the driver's seat was, plus how attractive the full-width rear bench seat looked. To be honest, I thought it was the first time a British RIB manufacturer had really got to grips with the modern looks and layout of a stylish Italian-type RIB, coupled with the deep 'V' seakeeping qualities of a British-type RIB. But 'all that glitters is not gold' and, whilst the looks were good, I was disappointed with the boat's integrity and, in particular, the way the craft appeared to shake and shudder each time it hit a wave. The deep 'V' hull worked well enough and the handling was fine, but the whole craft appeared to be 'loose', and I would liken it to driving certain convertible cars a few years back, where the whole vehicle, and particularly the dashboard, would shake every time the vehicle hit a pothole. Also, early used examples showed premature signs of wear, with hairline crazing of the gel coat, particularly around the rear seat and bow locker areas, and rapidly deteriorating upholstery. But that was then, and in February 2007 Cobra RIBs were sold to new investors whose first priority was to introduce significant improvements in the build quality of the craft.

The craft are now constructed using multi-axial fibreglass matting (an expensive but stronger material), top-quality resins and other construction materials, particularly in the upholstery department, to provide a vastly improved craft. Malcolm Patrick, new co-owner of Cobra RIBS, told me that the company's future programme includes keeping pace with latest developments in materials and RIB-building techniques, so that the company's products are amongst the top brands in terms of construction and finish.

It was with interest that this test was to take place with yours truly at the helm, for not only was I now able to report on the latest craft from the Cobra stable, I was also enjoying my first taste of the latest and most powerful production outboard in the world, the new Yamaha 350hp V8 four-stroke which was fitted to this model.

As previously mentioned, the latest Cobra looks and feels altogether a much better craft than the earlier examples. There is no denying the practical nature of the layout but there is an optional interior layout to the one we tested. Instead of the bow and stern sunbeds that were a feature of our test boat, an owner

can specify the model without sunbeds, and can have a second two-person bench-seat-cum-leaning-post arrangement instead.

Everything about the interior looks right and I particularly liked the seating, especially the two-man helm seat which cleverly folds to offer either comfortable seating or a secure standing leaning post; the positioning of the seat was also nearly spot-on for my short frame, but Cobra will set the seat to the owner's choice, within reason, so if you are two metres tall you can still drive comfortably. There is a useful, wide, stainless-steel grab rail and two decent-sized lockers located in the moulded back of this seat, the former proving invaluable if standing behind the helm seat, and the lockers ideal for stowing camera gear and clothing during the test.

The console is low enough to match the profile of the craft, yet big enough to

"The craft are now constructed using multi-axial fibreglass, top-quality resins and other construction materials"

provide reasonable protection and, with the wrap-around windscreen set at just the right height, the driver looks through it whilst seated and over it when standing. There is a recessed section for one's knees to fit under the dashboard and an obligatory 'suicide' seat set into the front of the console, fitted with excellent grab handles, making this a more practical seat than usual. The three-person rear seat looks invitingly comfortable, with its three independently contoured body-hugging sections, and so it proved to be. But being located well aft, it is the wettest seat on the craft, and on the day of the test, with a strong side wind blowing, one of our crew discovered just how wet. This is not to say the Nautique is a wet craft, in fact it gives a drier than average ride, it is just that aft seats invariably are the most susceptible to any spray that is flying off the hull.

The rear seat is a part of an attractive one-piece moulded section that incorporates a very useful, massive, 180cm x 120cm x 75cm (big enough for me to lie down in), waterproof locker. The lid that accesses the locker would normally have a sunbathing cushion fitted to it but this had been left off for the test, as had the bow locker cushion. I doubt that the weight of this cushion would have helped us to shut the lid against the strength of the gas struts, which required two men to close, but we were assured the future craft will be fitted with less powerful struts.

Behind the locker, either side of the outboard, are two flat, moulded bathing platforms, one of which is fitted with a boarding ladder. Above the rear locker is a very smart stainless-steel 'radar' arch which elegantly curves forwards and has the name 'Cobra' cut out of stainless plates on either side. It also features a very useful ski/wakeboarding towing eye located on the underside of the top of the frame, and I thought this whole stern area was very well conceived.

There is a separate anchor locker right up in the bows, housing an electric winch attached to a self-stowing Bruce-type anchor that protrudes through the hull just below the tube line. This is an attractive, purposeful-looking arrangement and, with its protective stainless-steel 'striker' plate, its location allows the tubes to still act as a fender on the bows. The rest of the bow section is dominated by a large, moulded sunbed arrangement, below which is a huge locker that should be able to swallow all the crew's gear - plus some. With such a huge amount of storage aft, some owners might prefer to go for the no-extra-cost option of a wrap-around bow-seat arrangement in place of this sunbed/locker set up, but both are practical options and it depends how the craft is to be used as to which interior should be chosen. The deck is a one-piece moulding with an anti-slip surface, but our test craft was fitted with the optional 'Flexiteak', and this adds an air of class to the craft, together with the usual benefits that this artificial decking provides.

The smooth-riding deep 'V' hull was originally designed in the mid 90s by yacht designer David Feltham, and the shape has remained largely unchanged to this day, with the exception of one major and noticeable

"The smooth-riding deep 'V' hull was originally designed in the mid 90s by yacht designer David Feltham and the shape has remained largely unchanged to this day"

difference; the buoyancy tubes have been raised significantly towards the stern and, whilst this provides extra internal depth and keeps the tubes clear of the water both at rest and at speed, there is a handling issue which we discovered when cornering. At rest there is a slight tilting of the craft before the tubes touch the water, and this is quite acceptable, however the high-speed cornering is definitely a little strange! As we cranked the steering over to effect a tight turn before the cameraman for some action shots, we noticed that the craft adopted a very steep angle of heel before the tubes came into contact with the water. Once they had touched the water, the stern of the craft appeared to lose grip, perhaps because air had become trapped between the hull and tube, creating an air pocket on which the craft balanced. Cornering at speed made the whole stern of the RIB go light and send the craft sideways in an alarming manner. This drifting happened on either lock at planing speeds and I felt that the hull/tube set up should be reviewed to see if this phenomenon can be eradicated.

With a massive V8 350hp outboard motor on the stern, I was not sure what to expect, but apart from some chine walking at the overall maximum speed of 47.8 knots that we achieved, the craft appeared to handle the size and weight of this monster motor very well. I was impressed with the relentless power delivery, and I rather liked the deep V8 throb which was quite different to the silky 'sewing-machine' smoothness of the six-cylinder motors that currently dominate the big outboard sector of the market. Far from thinking this motor may make an otherwise safe family RIB a bit of a handful, I think in the right hands, and with a degree of refining, this boat/engine combination will work very well.

The new Yamaha 350 V8 is without doubt a class act and I am sure it will be seen on many bigger craft very soon. Whether it is necessary on a Cobra 8.6m RIB, where the extra outlay in both initial cost and fuel consumption is significant, is debatable, and I would have thought a 225 or 250hp outboard would be plenty big enough on a craft of this type.

To sum up, whilst the issue of the RIB drifting out on corners is probably not dangerous, it is disconcerting, and if this could be eradicated it would certainly eliminate the only real flaw in this craft's otherwise excellent armoury. As we have seen on so many other RIBs, some of the older hull designs are still showing the way to more modern offerings, and the Cobra Nautique 8.6 possesses such a hull; it is smooth and dry-riding in rougher waters, it will cruise serenely along fully laden without an exaggerated nose-up attitude, yet it will show a good turn of speed when asked to deliver. The interior is fresh, modern and practical, and it is easy to understand why the Nautique range of Cobra RIBs has proved so popular over the years.

The Cobra Nautique 8.6m cuts a dash wherever she is seen and, with her new-found construction integrity, should continue to enjoy a strong following from existing and new clientele here and abroad.

Paul Lemmer

COBRA NAUTIQUE 8.6M

TECHNICAL DATA	METRIC
Length Overall:	8.6m
Width:	2.5m
Weight:	1500
Persons Capacity:	10
Engine Capacity:	450hp
Recommended Engine:	250hp to 400hp
Deadrise at the transom	
Tube Diameter:	20" tapering forwards
Number Of Chambers:	7
Max. Load Capacity:	1800kg
Tube Material:	Hypalon
CE Category:	B
Warranty:	12 Months

STANDARD EQUIPMENT

Stainless steel fuel Tank
Hydraulic Steering
Boarding Ladder
Stainless steel A Frame
Stainless Steel Grab rails
Rear Sculptured bench seat
Fire Extinguisher
Bilge Pump
Helm seat and console

PRICES (inc VAT)

£29,291

MANUFACTURER

Picton Boats Ltd t/a Cobra Ribs
St Theodores Way, Brynmenyn Ind Estate,
Bridgend, Cardiff, CF32 9TZ
T: 01656 724444
www.cobraribs.com

Performance/fuel consumption figures with Yamaha 350hp V8 OBM

RPM	Knots	GPH	LPH	0-20sec	0-30sec	0-40sec
2000	11.00	4.3	19.58	7.40	9.03	12.41
3000	22.50	7.8	35.52			
4000	33.00	13.3	60.56			
5000	42.00	24.4	111.12			
5700max	47.80	34.1	155.29			

Annex F

Passenger safety on small commercial high speed craft

Guidance Notes

Passenger Safety on Small Commercial High Speed Craft

Issue 1 March 2010

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Ref No.

Foreword

This guide provides skippers with information on the safe operation of small commercial high speed craft, such as Rigid Inflatable Boats (RIBs), sports boats and other purpose built vessels engaged in carrying passengers on fast sightseeing and adventure trips. It should be considered as a guide to best practice to ensure there is a balance struck between passenger enjoyment and their welfare.

For many passengers, this trip may be their first experience afloat in this type of craft. However competent skippers may be, with time they can become accustomed to the thrill and thus provide a ride that is exciting to themselves but, at the same time, could be considered terrifying by their passengers.

Another important consideration is that most passengers will probably have little, if any, boat awareness and will not be able to anticipate what will happen as the craft encounters varying sea conditions. In contrast to a thrill ride at a theme park where every twist, drop and turn is calculated to remain within acceptable safe parameters, a ride on a small high speed craft can be unpredictable and relies heavily upon the skill and judgement of the skipper at the helm.

Paul Mara, RYA Chief Powerboat Instructor

Photo courtesy of Ribcraft

Contents

1. Introduction

This guide covers the practical aspects of passenger safety and comfort afloat. It should be read in conjunction with the 'Small Passenger Craft High Speed Experience Rides Guidance' published by the Passenger Boat Association (PBA) which is an owners' and operators' guide giving details on best practice for the safe management of the vessel and dealing with passengers before they step on board.

2. Managing Phases of the Passage

The management of passage phases is jointly addressed in this document (for operational considerations) and the PBA's 'Small Passenger Craft High Speed Experience Rides Guidance' (for management considerations).

The following suggestions for all aspects of carrying passengers from initial booking to disembarking, have been gleaned from experience and should, as a minimum, be evaluated in respect of high speed passenger operations.

3. Management Considerations

Manning and qualification requirements and the suitability of potential passengers are addressed in the PBA's document 'Small Passenger Craft High Speed Experience Rides Guidance' , which should be read in conjunction with this document.

4. Crew:Passenger Ratio

4.1 The maximum number of passengers that can be carried safely on the vessel will be described in the Small Commercial Vessel (SCV) certificate. Under this Code the number of passengers will never exceed 12.

4.2 For vessels carrying more than 12 passengers, the maximum number of passengers must never exceed the vessel's Passenger Certificate.

While the Code of Practice for Small Commercial Vessels allows for craft in this category to operate with only a skipper, it is recommended that operators carry an additional trained crew member to assist in the safe operation of the craft and to monitor crew comfort. The additional crew member could prove essential in the event of an emergency requiring attention to a passenger, while the vessel returns to a safe haven.

When operating a vessel without an additional crew member, the SCV code of practice requires that the skipper should ensure that at least one other person on board is briefed on the following:

- Location of liferafts and the method of launching
- Procedures for the recovery of a person from the water
- Location and use of pyrotechnics
- Procedure for the operation of radios carried on board
- Location of navigation and other light switches
- Location and use of fire fighting equipment
- Method of starting stopping and controlling the main engine
- Method of navigating to a suitable port of refuge

5. Area of Operation

5.1 The majority of sightseeing trips follow a predetermined route to take in specific sites as advertised in the company's literature, eg bird watching at certain predetermined view points. However, it is recognised that some trips will require the vessel to seek out its attraction. For example, dolphins may frequent an area but it is down to the skipper to locate them on a particular day.

5.2 Thrill experience operators should ensure that, where practical, their procedures take into account interaction with other craft, avoid unacceptable hazards and clearly define routes to be taken.

5.3 In all cases it is important that operating parameters are set by the operator and that the skipper does not stray from the agreed area. Skippers, even if operating within the set parameters, should continue to dynamically risk assess the developing situation and always be prepared to curtail a trip. Operating procedures should take account of this.

5.4 Small high speed craft can be highly susceptible to changes in local sea conditions, so it is essential that skippers and crew are aware of all risks within their agreed operating area.

5.5 Operating in an area that is not covered by the operating procedures should be avoided.

6. Weather Limitations

6.1 When planning a trip on a given day, always take into account the weather forecast and make an assessment of the conditions that may be encountered.

6.2 If the conditions are less than favourable, consider reducing passenger numbers, reviewing seating positions and limiting speed. It may even be prudent to consider postponement or cancellation.

6.3 If approaching an area known to be hazardous in the prevailing conditions, stop and reassess your passage plan. If, by entering this area, you are committing the vessel to a potentially unacceptable risk, you should divert around the hazard or even consider turning back.

7. Passenger Safety Briefing

7.1 Operators have a responsibility of care to passengers and as such must ensure that skippers are sufficiently competent to drive the vessel and brief and assess passengers' suitability for the forthcoming experience. Monitoring the passengers during the voyage is essential

7.3 Not all passengers are suitable to engage in fast craft experiences. Very young children, elderly persons, people with reduced mobility and, in particular, pregnant ladies, post menopausal women, particularly those with a family history of osteoporosis, people with back or spine conditions and people with long term medical problems (particularly those who take steroids regularly) are examples of unsuitable passengers who will be exposed to increased risk.

The frail or elderly and those who cannot effectively brace themselves should also be discouraged from boarding. Passengers of many of the above descriptions have sustained injuries in the past. Refusal of passage for the above reasons should be handled with sensitivity.

7.3 Key to passenger safety onboard a craft of this type is a good pre-departure safety briefing. It sets the scene for what is to follow and gives the opportunity to assess the passengers' suitability and build their confidence and understanding of what is expected. Getting passengers to interact at this point should ensure they are more likely to inform you of any discomfort encountered during the voyage.

7.4 Before the start of every voyage the skipper must ensure that a safety briefing is given, which should include correct fitting and operation of lifejackets, the location and use of thermal protective aids and lifebuoys, and the procedures to be followed in an emergency. Suitable outdoor clothing and footwear is recommended.

It is acceptable to use safety cards in order to provide the information above, but it is prudent to check passengers' understanding if using this method.

See Annex 'A' – Fitting of Life Jackets

7.5 During the pre-departure brief, skippers should give an overview of the passage with details of any areas of significance, ie possible turbulence that may be encountered.

7.6 It is essential that advice is given on the importance of using correct handholds and adopting a good posture.

7.7 The magnitude of impact and movement on a small high speed craft is greater at the bow and reduces towards the stern. When deciding on where each passenger will sit, the skipper should take this into account.

7.8 It is important that you establish a method of communication for passengers to indicate if they are in discomfort or wish to speak to a crew member. This is often achieved by the individual passenger raising their hand.

7.9 Finally, in order to check that passengers have understood and are happy, encourage them to ask questions. Often, due to perceived peer pressure, personal pride or a desire not to spoil the fun of the majority, passenger feedback will be limited. Nevertheless a good skipper must be confident that all passengers are happy to proceed.

8. Passenger Boarding and Departure

8.1 Passengers must be supplied with, and briefed on the use of life jackets, and wear them at all times afloat. MCA requirements are specified in the SCV Codes of Practice.

8.2 During the boarding process passengers should be allocated to the most appropriate seating mindful of the ergonomics described in paragraph 7.6 above.

8.3 They should be assisted aboard, shown to their seats and advised how to sit, how to prevent vertical shock and how to use the handholds. 8.4 It is recommended that the following procedures and checks are undertaken as the vessel departs from the mooring or quay:

- Mooring ropes and warps inboard and secured ready for use.
- Passengers remain comfortable and relaxed.
- Controlled, safe, slow departure with suitable lookout.
- Vessel systems including engines, electrics and communications equipment functioning correctly.
- Subject to area of operation, build up speed slowly while monitoring passengers for comfort and posture.
- Maintain lookout and comply with navigation rules and other waterway users.

9. Safety During Passage

9.1 The guiding principle of ensuring a safe ride is to keep the craft in contact with the water. Launching a boat off a wave, or even the wash of another boat, may generate excitement but the forces encountered on landing can be extreme and can cause serious injury. Therefore seeking rough conditions to enhance the thrill of the trip should be considered less than best practice. Even in relatively benign conditions, the shock and vibration experienced can be surprisingly high.

9.2 Even in relatively calm conditions, high speed craft have been shown to experience impacts of 20g perpendicular to the deck, and in excess of 10g parallel to the deck.

9.3 High speed U and S turns should be carried out gently and at a safe speed. As each vessel will have specific ride characteristics, operators should ensure that their operating procedures clearly state maximum operating parameters to this effect. Again, it is important to remember that a boat travelling at speed and heeling to 15-20° may be exciting to the majority of passengers while frightening the less confident ones. Maintaining a safe speed and correct trim is critical. What can be considered safe on a calm day may become reckless in less favourable conditions. However, this does not mean that reducing speed and/or power is always the correct approach to challenging sea conditions.

9.4 Handling a small high speed craft in heavy sea conditions presents many challenges, even to the most experienced skipper, and the ability to find a safe passage through waves using an appropriate speed and correct trim of the vessel is essential. Skippers and crews should be familiar with the type of craft and experienced in the sea conditions they may encounter.

9.5 Passengers must be seated in the seats provided. Some small commercial vessel certificates allow for passengers to be seated on the inflatable collar of a RIB, but those passengers may be exposed to an increased risk of back injury due to the rotated posture they will have to adopt. If passengers are to sit on the inflatable collar, operators and skippers should be aware of the additional risks and consider adapting their operating procedures, passage plans and itineraries, especially if sea conditions are less than favourable.

9.6 When a boat jumps off a wave, it is usual for the passengers to part company with their seats. When the boat then impacts with the water the passenger can land on the seat with considerable force - increasing their risk of injury. The seats design features, such as the cushioning/padding can increase this risk of injury. While a thick, soft seat pan cushion may be comfortable at rest and in benign sea conditions, when exposed to choppy sea conditions this type of cushioning results in the passenger still travelling downwards - squashing the cushion - while the boat has landed with an impact, and is travelling upwards. This results in an increased impact force on the passenger as they and the boat seat are travelling in opposite directions at the point of impact. Therefore it is better to have seats with thinner, firmer padding.

9.7 Passengers should remain seated at all times when the craft is underway and only leave their position when the craft is properly secured alongside and they are instructed to do so by the skipper.

10. Hazard Perception

10.1 Hazards (or risks) can be identified and mitigated by applying simple planning based on experience. Many hazards can be recognised and addressed by reviewing the operator's intended business plan and scope of operation throughout the year. These may be considered 'foreseeable' and can be identified through a simple review meeting undertaken by all the key management and staff.

10.2 During the trip hazards may also arise spontaneously and without warning. These could occur during any of the trips undertaken in the company's operating area. Identification of hazards within an operating area is essential to the safety of a vessel, but identification alone will not necessarily remove the danger. It often rests with the skipper to make a decision, based on prevailing conditions at the time. What can be perceived as an unacceptable risk to one person may be considered safe by another. With this in mind operators should review carefully all actual and potential hazards, and ensure that robust procedures are in place and that all skippers and crew work within the operating parameters. These hazards may be considered 'spontaneous' and will need quick assessment and mitigation on the part of the skipper and crew while the vessel is underway.

The key to recognising and mitigating hazards is the development of robust and resilient Safety Operating Procedures.

11. Communications

11.1 Effective communication is essential, but can only be achieved by maintaining a listening watch on the appropriate channel for the area that you are operating in. Turning down the volume of the marine VHF radio could result in the skipper missing an essential weather or safety broadcast.

11.2 In many areas it is a local requirement to report all commercial vessel movements to the relevant authority at the start and finish of each voyage. Operators should ensure that adequate procedures are in place to meet any such requirement.

11.3 If mobile phones are used as part of the operator's communication network, their effective range should be assessed in all areas that the vessel may operate.

11.4 Skippers and crew members should be familiar with the company's emergency communication plan. This should be developed from experience, local knowledge and risk assessment. To be effective, procedures must be followed regardless of any potential local or commercial embarrassment.

11.5 Some operators use their own private channels. However, in an emergency, when the rescue services are required, contact the Coastguard at the earliest opportunity.

11.6 Should an emergency occur at sea, it Is required that initial Coastguard contact is established by VHF Marine Band radio. A mobile telephone however may be utilised as a potential secondary device.

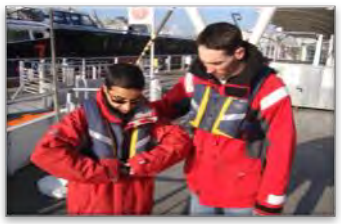
Annex A – Example of Fitting Life Jackets

(NB Although not illustrated here, life jackets with an additional crotch fitting are recommended)

Explain the waistcoat style and fitting

Assist passenger with fitting

Ensure zip is fastened to the top



Ensure adjustable cords are pulled both sides to give a firm fit

Check that jacket is fitted firmly and correctly

Point out the manual inflation toggle should jacket not inflate automatically

Bibliography

The following references and documents are provided as a source of further information.

The MCA Code of Practice for the Safety of Small Commercial Motor Vessels (Yellow Code)

Marine Guidance Note MGN 280(M) Small vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats

High Speed Craft Human Factors Engineering Design Guide. ABCD-TR-08-01 www.highspeedcraft.org

High Speed Motion, Ergonomics & Injury. Published by ST Research Ltd.

Marine Accident Investigation Branch (MAIB) *Celtic Pioneer* Report No 11/2009

RYA Powerboat Handbook by Paul Glatzel ISBN 0-901501-99-9

Milly – Declaration of Conformity

Declaration of Conformity of Recreational Craft with the Design, Construction and Noise Emission requirements of Directive 94/25/EC as amended by Directive 2003/44/EC

Name of craft manufacturer: [redacted]

Address : [redacted]

Town: [redacted] Country: UK

Name of Authorised Representative (if applicable): CE Proof - Human Improvements Ltd

Address: City Lab, 4-6 Dalton Square

Town: Lancaster Post Code: LA1 1PP Country: UK

Name of Notified Body for design and construction assessment (if applicable):

Address:

Town: Post Code: Country: ID Number:

Name of Notified Body for noise emission assessment (if applicable):

Address:

Town: Post Code: Country: ID Number:

Module used for construction assessment: ☐A ☒Aa ☐G ☐H

Module used for noise emission assessment : ☐A ☒Aa ☐G ☐H

Other Community Directives applied:

DESCRIPTION OF CRAFT

Craft Identification Number: GB APCR0095A212

Brand name of the craft: COBRA Type or number: Cobra Nautique 8.0m

Type of craft:
- ☐sailboat ☒motorboat
- ☐inflatable
- ☐other (specify): RIB

Type of hull:
- ☒monohull ☐multihull
- ☐other (specify):

Construction material:
- ☐aluminium, aluminium alloys ☒plastic, fiber reinforced plastic
- ☐steel, steel alloys ☐wood
- ☐other (specify):

Maximum Design Category: A☐ B☒ C☐ D☐

Engine power: Max. Recommended: 284 kW, Installed: 226 kW (if applicable)

Length of hull L_H: 8.0 m Beam of hull B_H: 2.6 m Draught T: 0.6 m

Type of main Propulsion:
- ☐sails ☒petrol engine
- ☐diesel engine ☐electric motor
- ☐oars
- ☐other (specify):

Type of engine:
- ☒outboard ☐inboard
- ☐z or sterndrive without integral exhaust
- ☐z or sterndrive with integral exhaust
- ☐other (specify):

Deck
- ☐fully decked ☐partly decked
- ☒open
- ☐other (specify):

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the craft manufacturer that the craft mentioned above complies with all applicable essential requirements in the way specified.

Name and function: [redacted] (Naval Architect) Signature and title: [redacted]
(identification of the person empowered to sign on behalf of the manufacturer or his authorised representative) (or an equivalent marking)

Date and place of issue: (yr/month/day) 11 / 12 / 04

COBRA RIBS [redacted]

Essential requirements (reference to relevant articles in Annex IA & IC of the Directive)	Standards	Other normative document/ methods	Technical file	Please specify in more detail (*: Mandatory Standards)
General requirements (2)	☒			EN ISO 8666:2002 *
Craft Identification Number – CIN (2.1)	☒			EN ISO 10087:2006 *
Builder's Plate (2.2)	☒	☐	☐	ENISO14945 + 6185.3
Protection from falling overboard and means of reboarding (2.3)	☒	☐	☐	ISO6185.3
Visibility from the main steering position (2.4)	☒	☐	☐	ISO11591
Owner's manual (2.5)	☒	☐	☐	ISO10240
Integrity and structural requirements (3)				
Structure (3.1)	☒	☐	☐	ISO6185.3
Stability and freeboard (3.2)	☒	☐	☐	ISO12217.1
Buoyancy and floatation (3.3)	☒	☐	☐	ISO6185.3
Openings in hull, deck and superstructure (3.4)	☐	☐	☐	N/A
Flooding (3.5)	☒	☐	☐	ISO6185.3
Manufacturer's maximum recommended load (3.6)	☒	☐	☐	ISO6185.3
Liferaft stowage (3.7)	☐	☐	☐	NO STANDARD
Escape (3.8)	☐	☐	☐	N/A
Anchoring, mooring and towing (3.9)	☒	☐	☐	ISO6185.3
Handling characteristics (4)	☒	☐	☐	ISO6185.3
Engines and engine spaces (5.1)				
Inboard engine (5.1.1)	☐	☐	☐	N/A
Ventilation (5.1.2)	☒	☐	☐	ISO11105
Exposed parts (5.1.3)	☐	☐	☐	N/A
Outboard engine starting (5.1.4)	☒	☐	☐	ISO11547
Fuel system (5.2)				
General – fuel system (5.2.1)	☒	☐	☐	ISO10088
Fuel tanks (5.2.2)	☒	☐	☐	ISO21487
Electrical systems (5.3)	☒	☐	☐	ISO10133
Steering systems (5.4)				
General – steering system (5.4.1)	☐	☐	☐	TYPE INSTALLED
Emergency arrangements (5.4.2)	☐	☐	☐	N/A
Gas systems (5.5)	☐	☐	☐	N/A
Fire protection (5.6)				
General – fire protection (5.6.1)	☒	☐	☐	ISO9094-1
Fire-fighting equipment (5.6.2)	☒	☐	☐	ISO9094-1
Navigation lights (5.7)	☒	☐	☐	72 COL REGS
Discharge prevention (5.8)	☐	☐	☐	NO STANDARD
Annex I.B – Exhaust Emissions	see the Declaration of Conformity of the engine manufacturer			
Annex I.C – Noise Emissions[1]	☐	☐	☐	SEE ENGINE MANUFACTURERS DOC
Noise emission levels (I.C.1)	☐	☐	☐	SEE ENGINE MANUFACTURERS DOC
Owner's manual (I.C.2)	☐	☐	☐	SEE ENGINE MANUFACTURERS DOC

[1] Only to be completed for boats with inboard engines or sterndrive engines without integral exhaust

Annex H

Extract from ISO 6185-3 – Inflatable boats

5.9 Motor-securing line attachment (outboard engines only)

A means for attaching a motor-securing line shall be provided at an appropriate position.

5.10 Towing device (all types)

All boats shall have, at their bow, a towing device suitable for securing a towline. See 7.4 for strength test.

5.11 Seating and attachment systems (where offered as a standard or optional equipment)

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

Type VIII boats have a factory-installed seating and attachment system.

5.12 Electrical installations (where offered as standard or optional equipment))

Any electrical installations shall conform to the requirements of the following International Standards, as applicable: ISO 10133, ISO 9097 or ISO 8849.

Type VIll boats shall be fitted with a factory-installed electrical system that conforms to ISO 10133.

Navigation lights, if fitted, shall meet the requirements of Colreg 72.

5.13 Fuel systems (where applicable)

Permanently installed fuel systems and fixed fuel tanks shall conform to ISO 10088.

Type VIll boats shall be fitted with a factory-installed permanent fuel system including permanent fuel tank(s).

5.14 Ventilation of petrol motor and petrol tank compartments (where applicable)

Ventilation of petrol motor and petrol tank compartments shall conform to ISO 11105.

6 Safety requirements of the completed boat

6.1 Maximum permissible number of persons

The maximum permissible number of persons n carried shall be determined by the manufacturer and shall not exceed that calculated using the following formula:

$$n = \frac{A_i - x}{0,3}$$

where

A_i is the inboard area, in square metres;

x is the area, in square metres, of the inboard area which cannot be utilized for the accommodation of persons. (e.g. steering console, exposed fuel tank(s), etc.).

Under no circumstances, shall the value n expressed in body mass exceed the maximum load capacity (see 6.4).

The value n shall always be rounded down to the nearest integer but, if the first decimal place is greater than 5, a child may be added or, if greater than 7, an adult may be added.

For calculations, the body mass of a child is defined as 37,5 kg and the body mass of an adult as 75 kg.

The data displayed on the builder's plate(s), see clause 8 e), shall include at least one adult and not more than one child.

6.2 Maximum motor power

The maximum motor power, in kilowatts, for inboard and outboard propeller-driven boats shall be determined by the manufacturer and shall not exceed that calculated using the following formula:

$$P_{max} = 10 \times F(d) - 33$$

where

P_{max} is the maximum motor power rating, in kilowatts, determined in accordance with ISO 8665;

F(d) is the dimensional factor = $l \times b$

where

l is the overall length of the boat, in metres, from the bow to the extremity of the rear float (excluding handholds or other fittings);

b is the overall beam of the boat, in metres (excluding handholds or other fittings).

NOTE The motor maximum power rating may be increased for boats supplied with a remote steering system installed by the manufacturer as standard equipment, provided they conform to the manoeuvring test procedure specified in ISO 11592.

6.3 Static stability of the boat

6.3.1 Requirement

The boat equipped with the manufacturer's maximum rated motor(s) (see 6.2) shall not capsize when the maximum permissible number of persons recommended by the manufacturer (see 6.1) move to one side of the boat.

6.3.2 Test method

Carry out the test with the motor(s) fitted but without a fuel tank and battery. Evenly distribute the test load (persons) over the test loading area of the boat as shown in Figure 2.

The total test load m_t, in kilograms, shall be calculated using the following formula.

$$m_t = (n \times 75) + 37{,}5 \quad \text{(for a child, if applicable)}$$

where

n is the maximum permissible number of adults determined by the manufacturer (see 6.1), i.e. 75 kg for each permissible adult and 37,5 kg for a child, if applicable.

7.6.2 Test method

Ensure that there is no water within the boat. Load the boat to the maximum load capacity recommended by the manufacturer. The distribution of this load shall represent the boat fitted with motor(s) of the maximum power rating (as specified by the manufacturer) and passengers seated in their normal positions.

Allow the boat to remain static in the water for 20 min.

7.7 Manoeuvring-speed test

RIB's capable of a top speed of 30 kn or more, which are supplied with a remote steering system, installed by the manufacturer as standard equipment, shall conform to the manoeuvring-test procedure specified in ISO 11592.

7.8 Bailing test (Type VIII boats only)

7.8.1 Requirement

Test the boat in the manner described in 7.8.2.

Closely examine the boat at the end of the test.

The deck area shall be substantially free of residual water.

7.8.2 Test method

Ensure that there is no water within the boat. Load the boat to the maximum load capacity recommended by the manufacturer. The distribution of this load shall represent the boat fitted with motor(s) of the maximum power rating (as specified by the manufacturer) and passengers seated in their normal positions. Close any deck drains and scuppers while filling. Fill the deck areas with water until it starts to flow out overboard. Evacuate the water from the flooded deck areas in less than 3 min by opening the deck drains and scuppers, and, if necessary, by the forward motion of the boat or by other means without using loose equipment or an electric bilge pump.

8 Builder's plate(s)

The craft shall be equipped with one or two clearly and indelibly printed or engraved plates displaying all the relevant data listed below.

a) Number of this part of ISO 6185 and type(s) to which the craft conforms.

b) Name of manufacturer or importer and country of origin.

c) Serial number and date of manufacture and type or model number. It is recommended to use the Hull Identification Number (HIN) coding system as detailed in ISO 10087.

d) Maximum motor power, in kilowatts (shown by symbol).

e) Maximum number of persons (shown by symbol).

f) Maximum load capacity [3)] (shown by symbol).

g) Recommended working pressure (shown by symbol).

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3) For manufacturers who wish to show more than the maximum load capacity for a boat that falls into more than one Boat Design Category (European Directive 94/25/EC), they may show this on the Builder's plate.

Annex I

Extract from ISO 11592:2001

4.2.3 Any manufacturer modification to a boat model that changes the centre of gravity of the craft vertically by more than 10 % of its height above the keel, e.g. for monohulls the bottom at the centreline, horizontally by more than 10 % of L_H or reduces the weight from the original model tested by more than 10 % of that specified in 5.3, shall be tested and rated as a separate boat type.

4.2.4 If installation of single or multiple engines of equal total engine power is possible as designed and manufactured, both single and multiple engine installations shall be tested if $v_{max} > 7\sqrt{L_H}$ kn in accordance with clauses 5 and 6.

4.3 Power capacity label and owner's manual

4.3.1 All craft with installed engine power or designed to be engine powered, shall display a permanent power capacity label. For outboard powered craft this label shall be located so as to be easily visible to the operator; for inboard, inboard-outboard and inboard water jet powered craft, it shall be located in the cockpit interior or in the engine compartment of the craft. The label shall give the maximum propulsion power rating of the craft as determined in accordance with this International Standard. Outboard powered craft supplied by the manufacturer for tiller or optional remote steering shall display a maximum propulsion power rating on the capacity label identified for both steering configurations and operator positions, if not of equal value.

The maximum propulsion power rating indicated on the capacity label shall be expressed in symbols, in accordance with ISO 11192, and/or in a language acceptable in the country of use. See Figure 1.

4.3.2 An owner's manual shall be provided with the craft and shall include at least the informational elements specified in annex B.

Figure 1 — Maximum propulsion power indication on capacity label

5 Test craft preparation

5.1 The test shall be conducted with the manufacturer installed largest engine power or designated maximum rated engine power for inboard, inboard/outdrive or inboard water jet drive powered craft; or for outboard powered craft, the rated outboard engine power to be indicated on the boat capacity label.

5.2 The propeller installed shall be as specified by the manufacturer for inboard or inboard/outdrive powered craft or, for outboard powered craft, available from the outboard engine manufacturer, providing maximum speed within the engine manufacturer's recommended full throttle RPM range at the trim setting as in 5.7.

5.3 Standard equipment permanently installed fuel tanks shall be no more than half full at the start of each test trial. Portable tanks, if used for outboard engines, one for each engine, shall be between full and half-full at the beginning of each test trial. Portable tanks shall be located in the manufacturer's designated positions, or, if none are designated, located as far aft as practicable.

5.4 Craft shall be equipped with the standard supplied or recommended remote steering system and location or the outboard tiller steering, if so intended for use. See 4.1.2.

5.5 Outboard engines shall be installed in the lowest vertical position on the engine mounting surface, or if so indicated in the owner's manual, the vertical position recommended by the craft manufacturer.

5.6 The craft bottom, engine and propeller shall be clean.

5.7 For propulsion units with power trim, the outboard, inboard-outdrive or water jet nozzle trim angle shall be adjusted to provide full throttle steady state craft speed short of excessive porpoising (fore and aft angular

oscillation) or propeller ventilation without loss of directional control. Propulsion units without power trim shall be set at the maximum trim angle (bow up) position permitting acceleration from displacement to planing speed and meeting these requirements.

6 Test conditions and determination of maximum speed

6.1 Testing shall be conducted on calm water, meaning a wind velocity below 5 m/s (10 kn) and maximum wave height of less than 0,2 m.

6.2 Testing shall be conducted with no onboard load other than standard supplied equipment, fuel as indicated in 5.3, and the operator, whose weight shall not be more than 90 kg or less than 70 kg.

6.3 The maximum full throttle craft speed, v_{max}, shall be determined by not less than two passages over a measured distance in both directions, or by any other suitable and accepted means of craft speed measurement accurate within 2 % or one knot of true boat speed, whichever is greater.

7 Manoeuvring test procedure and criteria

7.1 The test shall be conducted using the avoidance line test course as shown in annex A.

7.2 Operate the craft at full throttle, at v_{max} straight ahead on a course parallel with and within 5 m of marker line A-B.

NOTE Preliminary familiarization test runs may be conducted at any throttle setting and speed.

7.3 For boats with $v_{max} \leqslant 30$ kn, the distance, d, from the avoidance line at which turns are initiated shall be $6L_H$.

7.4 For boats with $v_{max} > 30$ kn, the distance, d, from the avoidance line at which turns are initiated shall be $6L_H$ plus two metres for each knot above 30 kn. See Table 1.

7.5 Turns shall be initiated when the bow of the boat reaches a point opposite marker B as established by the speed at which the boat is being tested.

7.6 Execute turn without reducing the throttle setting, without crossing the avoidance line and assume a course parallel with the avoidance line. Complete six test runs, turning three times to port and three times to starboard.

7.7 To pass the test, the craft must comply with the requirements of 7.1 through 7.6 in such a way that the operator experiences no loss of directional control or stability and no difficulties maintaining position at the helm.

7.7.1 If the maximum manoeuvring speed determined by test, i.e. not crossing the avoidance line while meeting the requirements of 7.6 and 7.7, for a given engine installation, is less than v_{max}, the craft manufacturer shall reduce the engine power installed for test and the capacity label maximum propulsion power rating until the craft passes the manoeuvring test in accordance with clause 7 at v_{max}; or,

7.7.2 for craft which can maintain directional control and stability while on a straight course at v_{max}, but are unable to meet the turning test requirements of 7.6 and 7.7, the turns required by 7.6 may be executed at a reduced speed with the distance from the avoidance line set in accordance with 7.4 for that reduced speed. The craft may be rated for that maximum power if the maximum manoeuvring speed at which the craft complies with the test requirements is not less than 85 % of v_{max} or less than $7\sqrt{L_H}$ kn; and

7.7.3 a speedometer is installed as standard equipment accurate to within 5 % of the maximum manoeuvring speed as determined in 7.7.2, and

7.7.4 a permanent sign indicating the maximum manoeuvring speed is installed in clear view of the operator with the information as indicated in the examples given in Figure 2.

Table 1

Max. speed, v_{max} kn	**Test**	**Distance from avoidance line, d** m	**If test failed**
$v_{max} \leqslant 7\sqrt{L_H}$	no	—	—
$7\sqrt{L_H} < v_{max} \leqslant 30$	yes	$6L_H$	Reduce power rating, retest at v_{max}, or retest at > 85 % of v_{max} to pass and install sign and speedometer
$v_{max} > 30$	yes	$6L_H + 2(v_{max} - 30)$	Reduce power rating, retest at v_{max}, or retest at > 85 % of v_{max} to pass, and install sign and speedometer
The power ratings to be posted on capacity label are determined by craft manufacturer.			

Warning

Manoeuvrability above ..... knots is limited
Sudden turns may cause loss of control
Reduce speed before making sharp turns in either direction
Read owner's manual

in language acceptable in the country of use, or

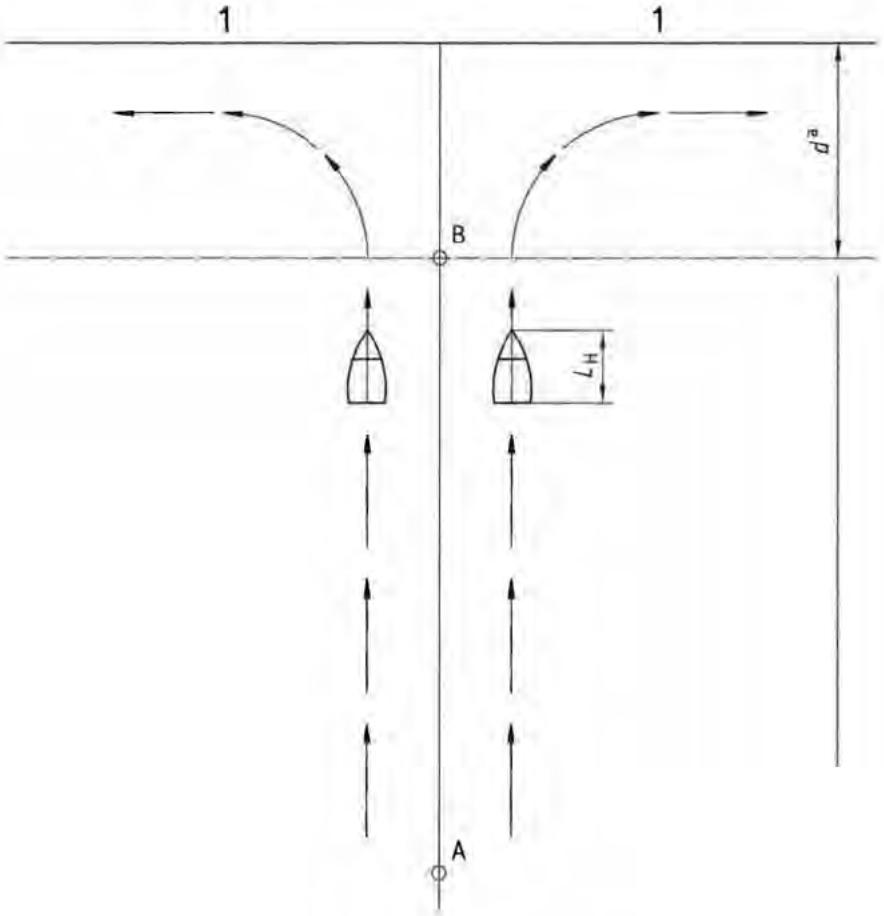
..... KNOTS MAX

The characters of the printing of the language sign shall not be less than 5 mm in height.

Figure 2 — Examples of manoeuvring speed signs

Annex A
(normative)

Manoeuvring test — Craft with $v_{max} > 7\sqrt{L_H}$ kn



Key

1 Avoidance line

a See Table 1.

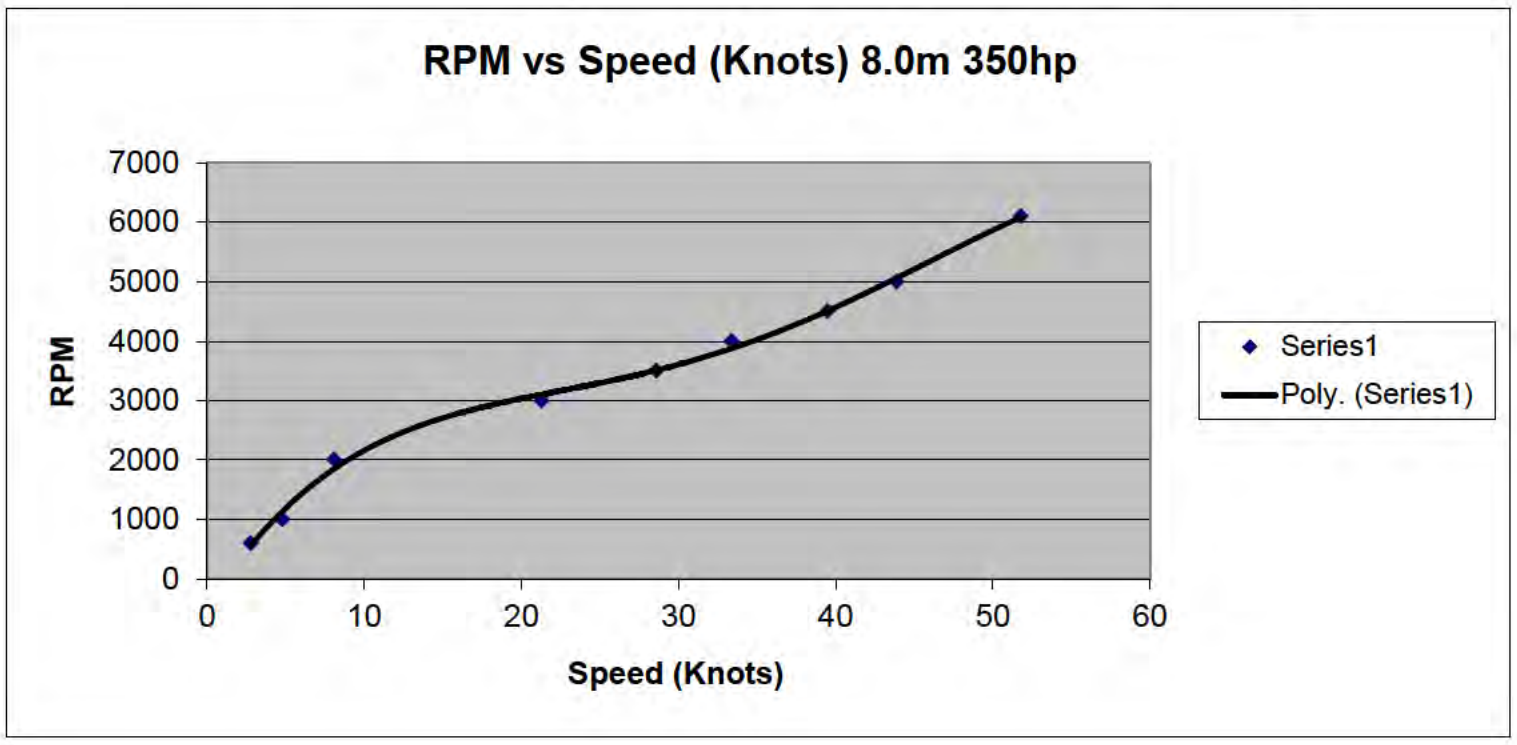
Figure A.1

Manufacturer’s manoeuvring test results

Performance Figures	
RPM	Speed (Knts)
600	2.8
1000	4.8
2000	8.1
3000	21.3
3500	28.6
4000	33.4
4500	39.5
5000	43.9
6100	51.8

Avoidance Test Results	
Maximum Allowed Distance ISO6185 - 4 (2012)= 99.6m	
(6 x Lh) + 2(Vmax - 26)	(6 x 8) + 2(51.8 - 26)
Maximum Allowed Distance ISO11592-2001 = 91.6m	
(6 x Lh) + 2(Vmax - 30)	(6 x 8) + 2(51.8 - 30)
Attempt No.	Distance Recorded (m)
1	81
2	74
3	77
Average Result	77.33333333

Key	
Lh	8.0m
Vmax	51.8 Knots



Owner’s manual

CE-Pro

Owners Manual

Cobra 8.0

Please keep this manual in a secure place and hand it over to the new owner when you sell the craft.

If this is your first craft, or you are changing to a type of craft you are not familiar with, for your own comfort and safety, ensure that you obtain handling and operating experience before assuming command of the craft. Any boat dealer or national sailing federation or yacht club will be pleased to advise you of local sea schools, or competent instructors.

Receipt

CRAFT IDENTIFICATION NUMBER GB-APCR

The owner of the new craft is required to sign this below to acknowledge receipt of this Manual.

I, the undersigned, confirm that I have received an Owners Manual on taking delivery of the vessel

NAME: _____

ADDRESS: _____

_____

SIGNATURE: _____ DATE: _____

Contents

1 WELCOME

Congratulations on becoming the owner of a Cobra rigid inflatable boat.

Make sure you receive a full explanation of all systems from the person transferring ownership to you.

1.1 Boating Experience

If this is your first craft, or you are changing to a type of craft you are not familiar with, for your own comfort and safety, ensure that you obtain handling and operating experience before assuming command of the craft.

Any boat dealer or national sailing federation or yacht club will be pleased to advise you of local sea schools, or competent instructors

Regardless of a craft's seaworthiness and its certified design category, protection from freak sea and wind conditions cannot be guaranteed. Beware of offshore winds and currents. The ability, experience and fitness of the crew, therefore, should be taken into consideration before making any voyage.

1.2 Responsibility

It is the boat owner/operator's responsibility to:

1 Know the limitations of your boat;
2 Follow the rules of the road;
3 Keep a sharp lookout for people and objects in the water;
4 Ensure that the anticipated wind and sea conditions will correspond to the design category of your boat and that you and your crew are able to handle the boat in these conditions;
5 Never sail when the operator is under the influence of drugs or alcohol;
6 Be aware of the crew/passenger's safety at all times;
7 Ensure all crew receive suitable training, particularly with regards to location and operation of safety equipment;
8 Reduce speed when there is limited visibility, rough water, people in the water nearby, boats, or structures;
9 Ensure the craft is properly maintained at all time;
10 Have the craft inspected by qualified personnel at regular intervals and whenever a cause for concern is raised; and
11 Ensure compliance with all legislation in place in the area of operation. These may include requirements for the carriage of life saving equipment, licensing of the helmsman and respect for the environment.

2 ABOUT THIS MANUAL

This manual has been compiled to help you to operate your craft with safety and pleasure. It contains details of the craft; the equipment supplied or fitted its systems and information on their operation. Please read it carefully and familiarise yourself with the craft before using it. Ensure that everyone who will operate the vessel reads this manual before setting out.
This manual complies with the EU Recreational Craft Directive (RCD) and should not be perceived as an exhaustive guide to the vessel. A manual is not a replacement for experience and common sense!

2.1 Original Equipment Manufacturer (OEM) Manuals

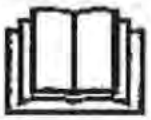
This manual includes important fundamentals regarding equipment supplied by other manufacturers. More detailed information regarding such equipment can be found in manuals provided by the OEM. A list of these manuals is given here

Engine
Steering gear
Navigation lights
Batteries
Instruments
VHF radio

2.2 Safety Labels

The craft and this manual show symbols which advise the owner/operator and crew of imperative safety precautions to follow when operating and/or servicing equipment. The following symbols may be found on your craft. They should be respected at all times.

	Hazard - usually followed by text description (see following section)
	Electrical Hazard
	Fire Hazard
	Location of fire extinguisher

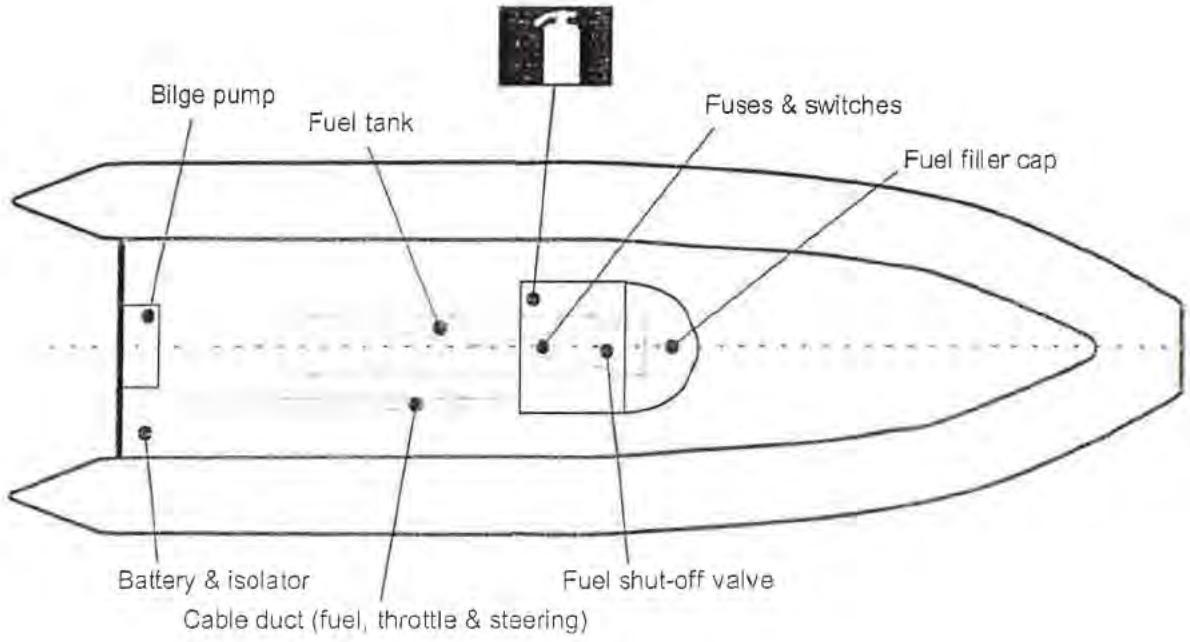
	Read the Owners Manual
	Fuel fill point: letter "D" denotes suitability for diesel fuel
	Sling position for safe lifting of the vessel
	Dedicated discharge opening for extinguisher

2.3 Explanation of Hazard Warnings

Danger	Denotes an extreme intrinsic hazard exists which would result in high probability of death or irreparable injury if proper precautions are not taken.
Warning	Denotes a hazard exists which can result in injury or death if proper precautions are not taken.
Caution	Denotes a reminder of safety practices or directs attention to unsafe practices which could result in personal injury or damage to the craft or components.
Information	Denotes useful or important facts or suggestions that can greatly enhance safety and efficiency of operations.

Caution	Do not remove or obstruct any safety label. Replace any label which becomes illegible.

3 GENERAL ARRANGEMENT



3.1 Boat Identification & CE Marking Classification

Type of Boat	Cobra 8.0
Hull Identification Number	GB-APCR
Name of Boat Manufacturer	APV MARINE LTD
RCD[1] Design Category	B, OFFSHORE
Maximum recommended number of people	12

[1] RCD = EU Recreational Craft Directive

3.1.1 RCD Design Category Explanation

This vessel carries the CE marking (shown here) to indicate that it complies with the EU Recreational Craft Directive. It has been assigned the *Design Category* explained below:

CE

A boat given design category B is considered to be designed to operate in winds up to force 8 (Beaufort scale) and the associated wave heights (significant wave heights up to and including 4m). Such conditions may be encountered on offshore voyages of sufficient length or on coastal waters when unsheltered from the wind and waves for several dozens of nautical miles. These conditions may also be experienced on inland seas of sufficient size for the wave height to be

3.2 Principal Dimensions

3.2.1 Hull Size

Length of Hull	8.000	(m)
Length - max. overall	8.000	(m)
Beam of hull	2.600	(m)
Beam - maximum	2.600	(m)

3.2.2 Maximum Recommended Power

Power measurement to EN ISO 8665 *Marine propulsion engines and systems - Power measurements and declarations*

Horsepower	350	(hp)
Kilowatts	265	(kW)

3.2.3 Weights

All weights in kilograms (kg)

Unladen Weight of craft (lightweight)			850
Maximum Number of Persons	900		
Baggage Weight & other carry-on weights	900		
Max Load as on Builder's Plate	1800	1800	
Weight of permanent stores & equipment	10		
Maximum Capacity of Fixed Fuel Tanks	190		
Essential safety equipment & liferaft	128		
Weight of Fluids & Permanent Load	328	328	
Maximum Recommended Load		2128	2128
Weight Fully Laden			2978

3.2.4 Fixed Tanks

Fuel Tanks	Tank Location	Max. Capacity (L)	Filler Location	Drain Location
Fuel tank	Below deck, midships	272	under helm seat	N/A

4 SYSTEMS DESCRIPTIONS

4.1 Bilge Pumps

Bilge Pumps are fitted as follows:

Location	Electric/ Manual	Make & Model	Capacity (Litres/min)	Bilge Compartment(s)
Transom sump	Electric	TBC	45	Common bilge

Information

Bilge pumps operate automatically by float switches located alongside the pumps. They can be overridden by manual switches located at the dash.

The bilge should always be checked after launch. A small amount of water in the bilge is normal. Large amounts of water or any signs of fuel or oil require immediate investigation. Never pump fuel or oil overboard when your boat is in the water.

Check function of pumps regularly & clear debris from their inlets.

It is recommended that a bailer/bucket is carried aboard for emergency bailing purposes. Ensure the bucket is protected against accidental loss.

⚠ Warning	Never use flammable solvents (i.e. kerosene) for bilge cleaning, however oily it becomes.

4.2 Electrical System

ALWAYS.....

- Check battery and charging system condition before going to sea
- Disconnect and remove the battery when the craft is in winter storage (cold weather areas) or long term storage

NEVER.....

- Work on the electrical installation while the system is energised;
- Disconnect shore-power connections when the system is in use.
- Modify the craft's electrical system or relevant drawings: installation, alterations and maintenance should be performed by a competent marine electrical technician;

- Alter or modify the rated current amperage of overcurrent protective devices;
- Install or replace electrical appliances or devices with components exceeding the rated current amperage of the circuit;
- Leave the craft unattended with the electrical system energised, except automatic bilge-pump, fire protection and alarm circuits.

⚠ Danger	Petrol vapour can explode Only fit ignition protected, marine parts to replace such items as starters, distributors, alternators, generators, etc.
⚠ Warning	Do not use jump leads in the petrol engine/tank space or carry out any activity that could create sparks.
⚠ Warning	Protective terminal covers, such as rubber boots on electrical connections, must be in place at all times except when servicing equipment.

4.2.1 DC System

Description

The direct current (DC) electrical system derives its power from the series of batteries listed below. The batteries supply the components listed in tables below which show the settings of the overload protection breakers/fuses. The battery voltage is indicated by the voltmeter at the panel board.

The DC system consists of the following circuits:

Battery Bank	Voltage	Rating (Ah)	Battery Location	Disconnect Switch
Engine start & service	12	110	Aft locker	Bottom of aft locker

The battery selector switch is located at: Inside aft locker

Main DC Panel Board Location: Dashboard

DC breakers/fuses are provided in the various circuits as shown in the following table:

12 V DC System

Circuit	Rating (A)	Fuse (F) or Breaker (B)
Instruments	3	Fuse
Navigatgion lights	3	Fuse
Anchor light	5	Fuse
Search light/spare	5	Fuse
Horn/spare	5	Fuse

DC Fuses

Location of Fuses: Below switch on underside of dash

⚠ Caution	Replace fuses with one of the same amperage rating as the original. A higher rating will render the circuit unprotected against overcurrent.

Information The amperage rating is marked on each fuse.

Removal of Batteries

To remove the battery cables:

1 Turn off all items drawing power from the battery.

2 Turn the battery switch to the OFF position

3 Remove the negative cable first, then the positive cable. To replace the cables, first replace the positive cable, then the negative.

⚠ Caution	Ensure that the battery ventilation ducts are kept unobstructed at all times.
⚠ Caution	When charging and (dis)connecting a battery ensure that no water or metal objects can contact the terminals.

Battery Disconnection

Battery selector switch location: Inside aft locker
Disconnect switch location(s): See table of batteries on previous page.

Information Batteries should be disconnected when not in use and especially while the boat is unattended.

⚠ Caution	Do not disconnect all batteries while the engine is running; alternator and wiring damage could occur.

Battery Maintenance

a. Check the fluid levels in the cells (if appropriate for the battery type) approximately every 4 weeks, and weekly in summer and in hot zones.

b. The fluid level must be between the lower and upper markings.

c. Replenish only with distilled water. Do not use metal funnel.

d. Coat battery terminal clamps with silicone grease.

e. Keep batteries clean and dry.

f. Battery life is shortened if it is drained to zero charge and it is recommended that batteries not be discharged by more than 50 percent. If the battery does become run down, recharge it as soon as possible.

g. Running the engine to recharge the battery may not be effective. The alternator only creates charging power at higher engine speeds, idling will not generate enough power to recharge the battery.

h. If you need to charge a battery, use only a battery charger designed to charge automotive/marine batteries. Use charger only when batteries are disconnected from the boat's electrical circuit. Follow the charger instructions.

i. If your boat will not be used for long periods remove the batteries from the boat and connect them to a charger.

4.3 Fuel System

The craft is fitted with a permanently installed Petrol fuel system supplying the propulsion engine(s).

Refer to manufacturer's instructions for details of the propulsion engines.

Refer to section 3.2.4 for details on tanks.

⚠ Warning	Do not smoke or use open flame when filling with fuel, when working on the fuel system and when in the engine room.
⚠ Danger	Never use a flame to check for leaks
⚠ Warning	Inspect fuel lines at least annually. Replace if deterioration or openings are found.
⚠ Warning	If leakage is detected and have the system repaired before further use. System repairs should be made by a competent person.

Refer to the schematic drawing at the back of the manual for further details.

4.4 Steering System

Information The boat's steering system has the following components:

Steering Hardware: Wheel
Turning device: Drive unit
Mechanism: 0

The craft is steered from the helm position which is described as: Central console

⚠ Caution	Refer to the system manufacturer's documentation for information pertaining to the steering gear.
⚠ Caution	All components of the steering system must undergo periodic inspection & maintenance to ensure safe operating conditions. Refer to the maintenance section of this manual for further details.
⚠ Warning	Failure of the steering system will cause loss of control of your boat. Any change in steering such as looseness, tightness, binding, etc., must be checked immediately by a qualified person.

5 PRE-LAUNCH OBSERVATIONS

5.1 Risk of Loss of Stability

The stability and buoyancy of this boat has been assessed on the basis of the weights specified in section 3.2.3.

⚠ Warning	The boat should never carry more than the manufacturer's recommended load. The load should be suitably distributed, bearing in mind that stability is most significantly reduced by any weight added high up in the boat
⚠ Caution	Stability can also be adversely affected by sloshing fluid. Bilge water should be kept to a minimum

⚠ Caution	The stability of this boat is significantly reduced at speeds above displacement speed.
⚠ Caution	Stability may be reduced when towing or lifting heavy weights using a davit or boom.
⚠ Caution	Breaking waves are a serious stability hazard

5.2 Risk of Flooding

⚠	Caution	The following openings are marked "WATERTIGHT OPENING - KEEP SHUT WHEN UNDER WAY" and care should be taken to observe this warning:

1. Transom drain plug

⚠	Caution	In addition to the above, in rough weather, hatches, lockers and companionway/doorways should be closed to minimise the risk of water ingress.
⚠	Caution	Ensure all limber holes are clear

5.3 Risk of Fire

Information Always keep the bilges clean and check for fuel regularly

⚠	Warning	NEVER • obstruct portable extinguishers in lockers • obstruct safety controls (shut off valves, switches) • modify craft's systems (especially fuel) • fill any fuel tank whilst machinery is running • smoke while handling fuel • use gas lights in craft

5.3.1 Fire Fighting Equipment

⚠	Caution	Location and capacity of extinguishers is given below. It is the responsibility of the boat owner/operator to: • check equipment at intervals as stated on equipment, • replace any extinguisher, if used, with one of same rating • inform members of the crew about location and operation of all fire fighting devices

Portable Extinguishers

Location & Description	Medium	Rating/ Capacity
Bottom of steering console	Powder	5A/34B

5.4 Risk of Falling Overboard

Information In the event of a member of the crew falling overboard they should be recovered using a boarding ladder or by using the outboard engine's cavitation plate as a step.

⚠ Caution	Care should be made to ensure the person being recovered is not pushed under the platform if the vessel is pitching. Consider recovery by use of a dinghy if necessary.
⚠ Warning	Most slips and falls occur during boarding and disembarking. Be aware that wet decks can be slippery. Wear slip resistant footwear at all times.

5.5 Liferaft stowage

⚠ Warning	A lifefraft with sufficient capacity to accommodate the maximum number of crew should be carried onboard.

Information A liferaft may stowed: In aft locker.

6 NAVIGATION & OPERATION

6.1 Use of Engine

Information Before starting the engine(s):

- Check fuel lines for damage & leaks.
- Check the bilge water level.
- Ensure that ventilation openings are clear to prevent overheating
- Ensure flow of cooling water
- Ensure there is sufficient fuel for the anticipated journey - including a margin for contingencies.

Take care not to damage fuel lines and check regularly that they are in good condition

Avoid placing flammable materials on or near hot parts.

⚠ Danger	If a fuel leak or fumes are detected, do not start the engine. Ensure all crew leave the boat and have a qualified person repair the fault as soon as possible.
⚠ Warning	Controls installed with the motor must have a start-in-gear protection device. It is the owner's responsibility to ensure this is so, should the engine or its controls be repaired/replaced.

6.2 Handling Characteristics

Information Maximum engine power: 336 kW 450 hp
Maximum speed: 50 knots 58 mph

Information Periodic inspection of the propeller for excessive wear or damage is recommended in order to maintain peak performance and to maximise the longevity of the engine.

Information Ensure all crew are informed about the craft's behaviour.
Before conducting any rapid acceleration or high-speed manoeuvres, passengers must be warned to sit and hold-on.
The helmsman may have to take sharp avoiding action at any time. Passengers should, therefore, be seated and holding-on when underway.

⚠ Caution	Seaways are infinitely variable and all craft can meet conditions that will challenge the boats handling characteristics and/or the helmsman's ability. Proceed with a margin for error at all times. Avoid making sharp turns at speed, particularly in a short seaway.
⚠ Caution	It is strongly recommended that helmsmen receive adequate training in boat handling before setting to sea for the first time.
⚠ Caution	Be aware that factors such as altitude, temperature, load, and bottom growth & engine trim angle may affect performance.

6.3 Visibility from the Main Steering Position

Information Operator vision from the helm can be obstructed by high trim angles of the craft and other factors caused by one or more of the following conditions:

- Propulsion engine trim angles
- Hull trim plane angles
- Loading and load distribution
- Speed
- Rapid acceleration
- Transition from displacement to planing mode
- Sea conditions
- Rain and spray
- Darkness and fog
- Interior lights
- Position of tops and curtains
- Persons or movable gear in operator's field of vision

The international regulations for preventing collisions at sea (COLREG's) and the rules of the road require that a proper lookout be maintained at all times and observance of right of way. Make certain no other vessels are in the path before proceeding.

6.4 Navigation Lights

Information Night boating requires running lights. The craft is fitted with the following navigation lights:

Light	Mounting position	Wattage (W)
Port	Side of arch	10
Stbd	Side of arch	10
All-round white	Top of arch	10

The running/navigation lights are controlled at the switch board.

⚠	Caution	Check for proper operation of navigation lights before heading out and carry replacement bulbs for all navigation lights
⚠	Caution	Always replace bulbs with one of the same wattage.

6.5 Anchoring, Mooring & Towing

Information It is the owners / operators responsibility to ensure that the mooring lines, towing lines, anchor chains, and anchors are adequate for the vessel's intended use. Owners should also consider what action will be necessary when securing a tow line on board.

⚠	Caution	The breaking strength of lines / chains should not exceed 80% of the breaking strength of the strong point to which it is attached.
⚠	Caution	Always tow or be towed at slow speed. Never exceed the hull speed of a displacement craft when towing or being towed.
⚠	Caution	A tow line shall always be made fast in a way that it can be released when under load.

Information When at anchor, it is damaging to leave the full load of the boat resting on the windlass. It is recommended that the chain be tied onto a local strong point.

6.6 Filling With Fuel

⚠	Warning	Never smoke when refuelling, or inspecting or working with the fuel system.

Information See section 3.2.4 for the locations of filler caps.

Use the following procedure for filling tanks:

- Splash water over the deck-area around the deck fittings - before filling. This will prevent spilled fuel from adhering to the deck surface
- Open the deck fitting & start filling the tank.
- Check the contents of the tank by monitoring the tank level indicator
- Don't fill the tank to its maximum: allow for expansion
- close deck fittings tightly, but don't over-tighten since this will damage the rubber o-rings
- (make an entry in ship's log)

⚠	Caution	Fuel is considered chemical waste. Keep and absorbing cloth close by when filling tanks.

7 MAINTENANCE

Regular inspection and maintenance is an essential activity to ensure the boat's longevity and the crew's safety.

This section includes a generic table which details typical inspection and maintenance intervals. This is not specific to your craft and some sections will not apply.

The necessary frequency of service or maintenance depends upon the environment in which the boat operates. The intervals listed in this section should be viewed as maximums.

⚠	Caution	Modifications that may affect the safety characteristics of the craft should be assessed, executed and documented by competent people.
⚠	Caution	Any change in the disposition of the masses aboard may significantly affect the stability, trim and performance of the boat

KEY: X - Activity required Y - Activity required by qualified individual

		INTERVAL				
Item	Required Maintenance/Service	Before Every Use	After First 20 Hours	Every 25* Or 50 Hours	Every 50* Or 100 Hours	Every 6 mnth or Annual
Miscellaneous						
Battery	Check water level	X	X	X		
Navigation Lights	Check working	X				
Bilge Area	Clean & limber holes free					X
Bilge Blowers	Hose connections tight			X		X
Bilge drain plug	Installed and tight	X				
Zinc anodes	Check and replace	As needed				
Hull	Check for loose, damaged or missing parts	Whenever out of the water and always after striking an object				
Controls						
Steering	Check for proper operation					Y
Steering	Power steering oil level	X				
Throttle	Lubricate. Include all shift linkage and pivot points		X		X	X
Electrical						
Connections	Check for looseness					Y
Engine						
Alarm	Check	X				
Cooling System	Check for leaks with engine running	X				
Crank vent system	Clean		X		X	
Drive belts	Check for wear	X				
Exhaust System	Check for leaks	X	X		X	
Flame Arrestor	Clean		X		X	
Fuel Filter	Replace				X	
Mounts (Fasteners)	Tighten		X			X
Oil and Filter	Replace				X	X
Oil Level	Check	X				
Fuel System						
Connections & Lines	Check for leaks & wear	X	X	X		
Tanks	Check for leaks & tightness of connections	X	X	X		
Water Separator	Replace		X			X
Propeller	Inspect for damage	Always after striking object				

7.1 Maintenance & Storage of Tubes

⚠ Warning	The tubes are made of a material that will deteriorate when stored in strong direct sunlight for prolonged period.

Always store the boat inside, away from harmful ultra-volet rays.

UV protection waxes are recommended to prolong the life of the tubes and to preserve their colour.

⚠ Caution	Certain liquids, such as (battery) acids, oil and petrol can be corrosive to the tube material.

Rinse-off any liquid other that water immediately that comes into contact with the tubes.

7.2 Maintaining the Electrical System

⚠ Warning	Work on electrical wiring can create shock hazards or sparks.

Always disconnect power sources and shut off battery switch, breakers and/or pull fuses before checking electrical wiring or connectors.

⚠ Caution	To prevent arcing or damage to the alternator, always disconnect battery cables before doing any work on the engine's electrical system.
⚠ Caution	Power feeds for accessory equipment must not be taken from the voltmeter terminals.

Information Check all wiring for proper support.

Check all wiring insulation for signs of fraying or chafing.

Check all terminals for corrosion - corroded terminals and connectors should be replaced or thoroughly cleaned.

Tighten all terminals securely and spray them with light marine preservative oil.

8 ENVIRONMENTAL AWARENESS

The previous sections of this manual provide information on how to protect the boat and its crew from the environment. This section gives information on how the environment may be protected from the boat and its crew.

The *environment* should be understood as including one's neighbours as well as the world of plants and animals.

In many regions of the world, there are strictly enforced regulations regarding environmental protection. It is the responsibility of the owner/operator to be aware of applicable regulations and to ensure compliance with them.

8.1 Leakage of Petrochemicals

⚠	Warning	Any oil must be treated as chemical waste.

ALWAYS: Investigate the source of any oil leaks as soon as possible.

Dispose of recovered spilt oil correctly.

Have oil-absorbing cloths or rolls on board.

NEVER: Dispose overboard of any oil, paint or other chemical that is potentially harmful to the environment. Sanctions are in place in most parts of the world for those who disregard this rule!

8.2 Black & Grey Water

⚠	Warning	The discharge of effluent into navigable waters is forbidden by law in many areas. If such discharge causes a film or sheen upon or a discoloration of the surface of the water or causes a sludge or emulsion beneath the surface of the water, violators may be subject to a penalty. It is the responsibility of the boat user to ensure that they are aware of local legislation regarding discharge
⚠	Caution	Keep bilges are not kept clean to avoid the automatic bilge pumps discharging illegal effluent.

8.3 Household Waste

⚠	Warning	When at sea for periods longer than space allows onboard storage of waste, only jettison organic waste.

ALWAYS Retain any household waste until it can be properly disposed of ashore.

8.4 Noise

NEVER Make excessive noise. Most people take to the water for relaxation which is ruined by noise.

Run the engine or generator unnecessarily.

Information This craft and engine complies with EU Regulations for noise and exhaust emissions. It is the responsibility of the Owner to ensure that the craft's engine and exhaust system are maintained to keep the craft within acceptable limits.

ALWAYS Have the engine & exhaust system inspected & cleaned by a qualified professional at regular intervals.

Inspect the exhaust system to ensure connections are secure.

Check the free flow of exhaust gasses through the silencer (muffler) to ensure that it is unblocked, every time you set out.

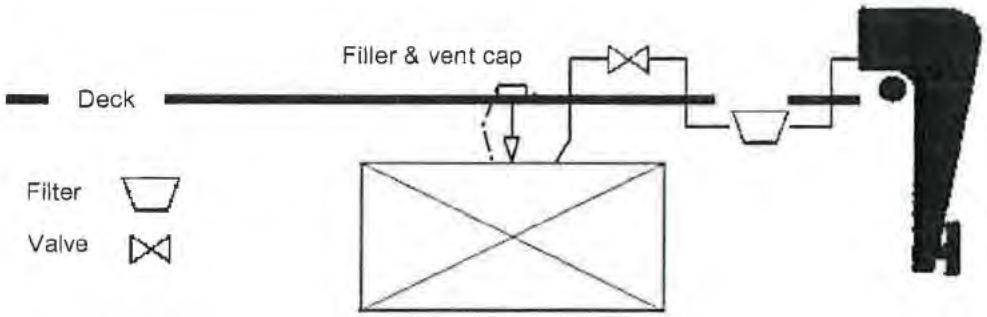
Stop if you have any doubts about the exhaust system.

8.5 Wash / Waves

ALWAYS Adapt your speed to the water in which you are navigating. Consider the comfort and safety of other (particularly small) boats around you.

⚠	Caution	Be aware that in some areas speed restrictions are in place to avoid erosion of banks/coastline.

Fuel System Schematic Drawing



Annex L

Extract from technical file, Declaration of Conformity

A Title Page

CE-Pro™

EU Recreational Craft Directive
2003/44/EC (94/25/EC as amended)

TECHNICAL CONSTRUCTION FILE

Stage of Completion:	☉ Complete Build ○ Part Build
Project Ref 1:	
Assessment basis:	**New Build Assessment**
Boat Name:	
Model/Class of Boat:	**Cobra 860**
Type of Craft:	**Recreational RIB**
	☐ Requires special operating procedures and/or crew securing devices
Hull/Craft Identification Number:	**GB-PBCR**
RCD Design Category:	**B**
Conformity Assessment Module:	**Aa**
Notified Body:	**HPI Verification**
Notified Body Certificate No.:	
Designer:	**Picton Boats Ltd.**
Structural Designer:	**Picton Boats Ltd.**
Manufacturer	**Picton Boats Ltd.**
Hull Builder:	**Picton Boats Ltd.**
Fit-Out By:	**Picton Boats Ltd.**
Agent/Distributor or other Rep.:	
Manufacturer's Authorised Rep.:	**none**
Signatory of Declaration:	**Picton Boats Ltd.**
Date of NoBo Cerificate:	**2007/01/01**
Mandatory storage until :	**January 2, 2017**

Register of Craft Built to the Specification of this TCF

Craft/Hull Identification Number	Notes

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Principal Dimensions & Description (EN ISO 8666)

Description of Type

Number of hulls	1			
Principal Source of Power	Motor	Auxiliary sails provided ☐		
Craft Type	Rigid Inflatable			
Maximum speed	50	knots		
Deck coverage (ref. EN ISO 12217)	Any			
Crew Limit	12	adults	0	children
Operating mode	Planing			
Accommodation Arrangement	Open			
Hull Form	Hard chine			
Cockpit Arrangement	☐ None ☐ Quickdraining ☐ Watertight ◉ Other			

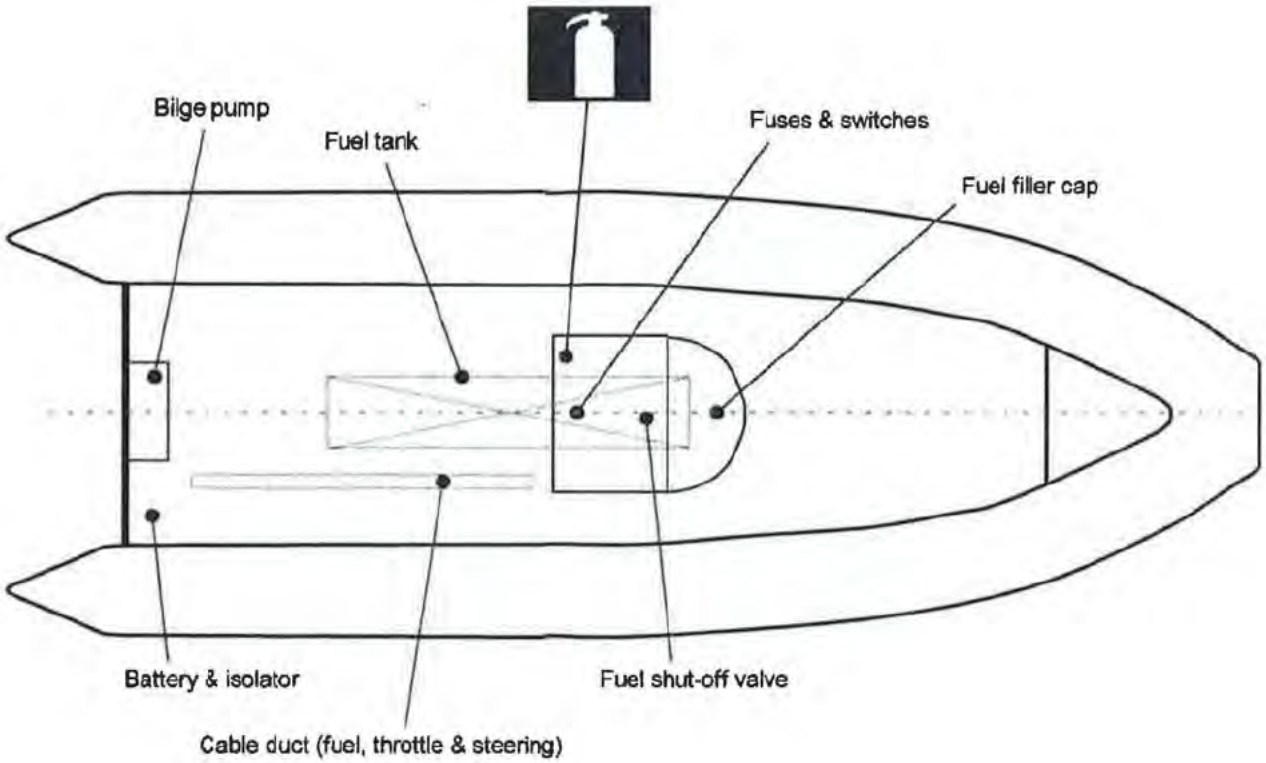
Hull Size		**@ Min. Operating Condition (M_{MOC})**	**@ Loaded Disp. Condition (M_{LDC})**		**For Calculations**
Length of Hull	L_H	8.500		(m)	Required
Length on waterline	L_{WL}			(m)	Required
Length - max. overall	L_{MAX}	8.500		(m)	Required
Beam of hull	B_H	2.600		(m)	Required
Beam on waterline	B_{WL}			(m)	Optional
Beam - maximum	B_{MAX}	2.600		(m)	Required
Beam of chines	B_C			(m)	Required
Transom width at sheerline	B_t			(m)	N/A
Deadrise Angle	β			(degrees)	Required
Freeboard fwd	F_F	0.730		(m)	Required
Freeboard amidships	F_M	0.480		(m)	Required
Freeboard aft	F_A	0.520		(m)	Required
Draft - canoe body amidships	T_M			(m)	Required
Draft of canoe-body (max)	T_C			(m)	Required
Maximum draft	T_{MAX}			(m)	Required
Air draft	H_A			(m)	Required

Materials of Construction		Framing System
Hull Bottom	Composite - Single Skin	Longitudinal
Topsides		
Deck	Composite - Sandwich	**Bottom Arrangement**
Superstructure		Double Bottom

Keel Arrangement

☐ Bolted	☐ Lifting	☐ Canting	☐ Bulb	☐ Winged
☐ Fin	☐ Tandem	☐ Long	☐ Bilge	☐ Dagger/ Centre Board
Notes/Other Arrangement:				

Integral Swim Platform	◉ None	○ Filled	○ Hollow



Directive (RCD) **Technical Construction File (TCF)**

ESR	Description	Section	Standard Applied
Handling characteristics			
4	Handling characteristics	4	No standard: EN ISO 11592 applies up to 8m length

Installation requirements

5.1.1	Inboard Engine	5.1	N/A - outboard only
5.1.2	Ventilation		EN ISO 11105:1997 "Ventilation of petrol engines and/or petrol
5.1.3	Exposed parts of engine		No applicable standard
5.1.4	Outboard engines		EN ISO 11547:1995 Small Craft - Start-in-gear Protection
5.2.1	Fuel System – General	5.2	EN ISO 10088:2001 "Permanently installed fuel systems and fixed fuel tanks"
5.2.2	Fuel System – Tanks		
5.3	Electrical system	5.3	EN ISO 10133:2001 "Electrical systems – Extra low voltage d.c. No AC electrics
5.4.1	Steering system – General	5.4.1	EN ISO 15652:2005 Remote steering systems for inboard mini jet boats
5.4.2	Emergency steering arrangements	5.4.2	N/A - outboard engine (RCD Annex 1 ESR 5.4.2)
5.5	Gas system	5.5	N/A - no LPG system fitted
5.6.1	Fire protection - General	5.6	EN ISO 9094-1:2003 Fire protection – Part 1: "Craft with a hull length up to and including 15m"
5.6.2	Fire protection – Fire-Fighting equipment		
5.7	Navigation Lights	5.7	1972 Colreg Rules
5.8	Discharge prevention	5.8	N/A - no heads onboard

Declaration of Conformity of Recreational Craft with the Design, Construction and Noise Emission requirements of Directive 94/25/EC as amended by Directive 2003/44/EC

Name of craft Manufacturer: Picton Boats Ltd.

Address: Brynmenyn Industrial Estate

Town: Bridgend Post Code: CF32 9TZ Country: United Kingdom

Name of Authorised Representative (if applicable):

Address:

Town: Post Code: Country:

Notified Body for design & construction assessment (if applicable): ID Number: 1521

Name: HPI Verification

Address: Unit 14, Seaway Parade

Town: Baglan Post code: SA12 7BR Country: United Kingdom

Report/Certificate Ref. No: Date: (y/m/d)

Notified Body for noise emission assessment (if applicable): ID Number:

Name:

Address:

Town: Post code: Country:

Module used for construction assessment: ☐ A ■ Aa ☐ B+C ☐ B+D ☐ B+E ☐ B+F ☐ G ☐ H

Module used for noise assessment: ☐ A ☐ Aa ☐ G ☐ H

Other Community Directives applied:

DESCRIPTION OF THE CRAFT

Craft Identification Number: GB - PBC R

Brand name of the craft: Cobra 860 Type or Number: Recreational RIB

Type of Craft:
- ☐ sailboat ■ motorboat
- ■ inflatable
- ☐ other (specify):

Type of Hull:
- ■ monohull ☐ multihull
- ☐ other (specify):

Construction Material:
- ☐ aluminium, aluminium alloys
- ■ plastic, fibre reinforced plastic
- ☐ steel, steel alloys
- ☐ wood
- ☐ other (specify):

Type of Main Propulsion:
- ☐ sails ■ petrol engine
- ☐ diesel engine ☐ electric motor
- ☐ oars
- ☐ other (specify):

Type of Engine:
- ■ outboard ☐ inboard
- ☐ z or sterndrive without integral exhaust
- ☐ z or sterndrive with integral exhaust
- ☐ other (specify):

Deck:
- ☐ fully decked ☐ partly decked
- ■ open
- ☐ other (specify):

Maximum Design Category: ☐ A ■ B ☐ C ☐ D

Engine Power: Max. Recommended: 335.7kW Installed power: 335.7kW

Length of hull, L_H: 8.500m Beam of hull, B_H: 2.600m Draught, T: 0.000m

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the craft manufacturer that the craft mentioned above complies with all applicable essential requirements in the way specified.

Name & function:

(Identification of the person empowered to sign on behalf of the manufacturer or

Signature & Title:

(or and equivalent marking)

Date & place of issue: (yr/month/day)

Essential Requirements (ref. relevant article in Annex IA & IC of the Directive)	Standards	Other normative doc./methods	Technical File	Please specify in more detail (* Mandatory Standards)
General requirements (2)	X			EN ISO 8666:2002 "Principal data"*
Craft Identification Number - CIN (2.1)	X			EN ISO 10087:2006 "Hull Identification – Coding system"*
Builder's Plate (2.2)	X			EN ISO 14945:2004 "Builder's plate"
Protection from falling overboard & means of reboarding (2.3)	X			ISO/CD 6185-4:2004 "Inflatable boats - Inflatable boats – Part 4: Boats with an overall length of between 8 m and
Visibility from the main steering position (2.4)	X			EN ISO 11591:2001 Engine driven small craft – Field of vision from helm
Owner's manual (2.5)	X			EN ISO 10240:1998 "Owner's manual"
Integrity and structural requirements (3)				
Structure (3.1)			X	Proven service history
Stability and freeboard (3.2)	X			EN ISO 12217-1:2002 Part 1: Non-sailing boats of hull length greater than or equal to 6m
Buoyancy and floatation (3.3)	X			
Openings in hull, deck and superstructure (3.4)	X			No windows hatches or doors fitted EN ISO 9093-1:1998 "Seacocks and through hull fittings - Part 1: Metallic" EN ISO 9093-2:2002 "Seacocks and through hull fittings - Part 2: Non-metallic"
Flooding (3.5)	X			EN ISO 15083:2003 "Bilge pumping systems" No quick-drainnig or watertight cockpit fitted onboard the craft
Manufacturer's maximum recommended load (3.6)	X			EN ISO 14946:2001 "Maximum load capacity"
Liferaft stowage (3.7)			X	No applicable standard
Escape (3.8)	N/A			No accommodation
Anchoring, mooring and towing (3.9)	X			EN ISO 15084:2003 Small Craft – Anchoring, mooring and towing – Strong points
Handling characteristics (4)	X			No standard: EN ISO 11592 applies up to 8m length
Engines and engine spaces (5.1)				
Inboard engine (5.1.1)			N/A	N/A - outboard only
Ventilation (5.1.2)	X			EN ISO 11105:1997 "Ventilation of petrol engines and/or petrol tank compartments"
Exposed parts (5.1.3)			X	No applicable standard
Outboard engine starting (5.1.4)	X			EN ISO 11547:1995 Small Craft - Start-in-gear Protection
Fuel system (5.2)				
General - fuel system (5.2.1)	X			EN ISO 10088:2001 "Permanently installed fuel systems and fixed fuel tanks"
Fuel tanks (5.2.2)	X			
Electrical systems (5.3)	X			EN ISO 10133:2001 "Electrical systems – Extra low voltage d.c. installations" No AC electrics
Steering systems (5.4)				
General - steering system (5.4.1)	X			EN ISO 15652:2005 Remote steering systems for inboard mini jet boats
Emergency arrangements (5.4.2)			N/A	No applicable standard
Gas systems (5.5)	N/A			N/A - no LPG system fitted
Fire protection (5.6)				
General - fire protection (5.6.1)	X			EN ISO 9094-1:2003 Fire protection – Part 1: "Craft with a hull length up to and including 15m"
Fire fighting equipment (5.6.2)	X			
Navigation lights (5.7)		X		1972 Colreg Rules
Discharge prevention (5.8)	N/A			N/A - no heads onboard
Annex I.B - Exhaust Emissions	See Declaration of Conformity of the engine manufacturer			
Annex I.C Noise Emissions	X			Engine supplied with certificate
Noise emission levels (I.C.1)	X			
Owner's manual (I.C.2)			X	No applicable standard

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Inflatable Craft Parameters

Length overall	l	8.50	m
Beam overall	b	2.60	m
Inboard length	l_i	7.30	m
Inboard beam	b_i	1.62	m
Non-seating inboard area	x	0.84	m^2
Number of chambers	n	7	chambers

Chambers

Chambers	Chamber ref.	Diameter (mm)	Length (mm)	Volume (m^3)	Deviation
Front	1	500	1960	0.38	13.5%
Port fwd	2	500	1688	0.33	2.2%
Port mid	3	500	1688	0.33	2.2%
Port aft	4	500	1688	0.33	2.2%
Stbd fwd	5	500	1688	0.33	2.2%
Stbd mid	6	500	1688	0.33	2.2%
Stbd aft	7	500	1688	0.33	2.2%
				0.00	0.0%
				0.00	0.0%
Average		500	1727.143	0.34	
Totals	7		12090	2.37	13.5%

Buoyancy of Tubes	**23870**	**N**

Recommended working pressure of tubes	**0.15**	**bars**

Fittings Provided

- Rowlocks ☐
- Open floor & self baling ☐
- Transom fitted ☑

Applicable standard: **ISO/CD 6185-4**

Type of Inflatable: **Type X**
(ref ISO 6185)

Manufacturer's Maximum Recommended Load

	Mass (kg)	Mass (lb)	Volume (litres)	Density (kg/m³)	
Solid Ballast		0			If known
Permanently installed engine	350	772			Required
Lightship excluding engine	850	1874			
Permanent stores & Equipment	10	22			
Symmetrical Ballast Tanks	0	0		1025	
Asymmetric Ballast Tanks	0	0		1025	
Moveable ballast		0			
Petrol	190	420	272	700	
Fresh Water	0	0		1000	
Holding Tank	0	0		1000	
Essential Safety Kit	36	79			
Liferaft	92	202			
Carry-on load	900	1984			
Crew	900	1984			
Growth		0			
Max. Trailer Weight		0			

Permanent Stores & Equipm't

Description	Mass	
		kg
		kg
Toolkits	1	kg
Navigation equip.	1	kg
Ropes	6	kg
Books, charts etc.	2	kg
		kg
		kg
		kg
		kg

	(kg)	(lb)
Lightship including engine =	**1,200**	2646
Minimum Operating Condition (m_{MOC}) =	**1,488**	3279

Lightship including engine =	1200 (kg)
Permanent stores	10 (kg)
Symmetric ballast tanks	0 (kg)
Essential safety kit	36 (kg)
Liferaft	92 (kg)
Minimum crew	150 (kg)

Loaded Displacement Condition (m_{LDC}) = 3,328

Lightship including engine =	1200 (kg)
Permanent stores	10 (kg)
Symmetrical Ballast Tanks	0 (kg)
Asymmetric Ballast Tanks	0 (kg)
Fuel	190 (kg)
Fresh Water	0 (kg)
Holding Tank	0 (kg)
Essential Safety Kit	36 (kg)
Liferaft	92 (kg)
Carry-on load	900 (kg)
Crew	900 (kg)
Growth	0 (kg)
Moveable ballast	0 (kg)

Maximum Recommended Load (m_{MTL}) = 2,128

Maximum Load (as on builder's plate) = 1,800 3968

Ratio, m_{LDC} / m_{MOC} = 2.237

3.2 Stability Test Weights

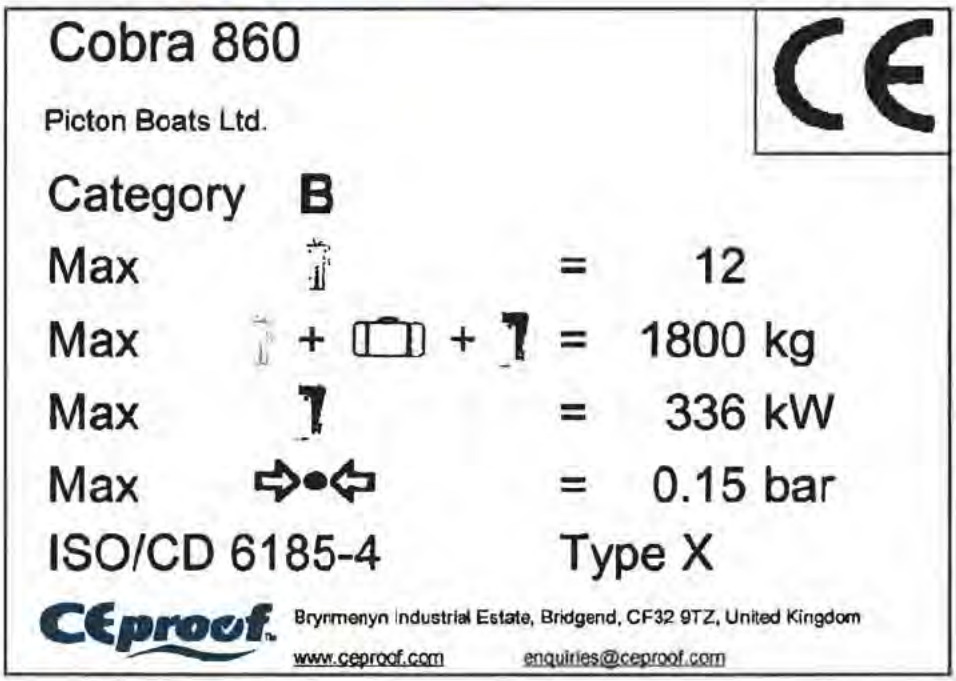
	Quantity	Weight	Total
Water cannisters	19	25	475
Dave	1	74.6	74.6
Hugh	1	75.1	75.1
Mike	1	101.6	101.6
Alasdair	1	103.1	103.1
		TOTAL	829.5

ISO/CD 6185-4:2004 - Inflatable Boats with a maximum motor power rating of 15 kW and greater

Clause	Issue	Evidence
4.1	Components & materials to be fit for purpose and resistant to rot?	Henshaws Tubes - See Annex III for evidence.
4.2	**Reinforced materials making up the hull (excluding glass-fibre-reinforced plastics components)**	
4.2.1	Serviceable temperature range to be at least -20°C to +60°C	Henshaws Tubes - See Annex III for evidence.
4.2.2	Resistance to liquids to be tested on outside to ISO 1817 but with ASTM oil #1 (refer to standard for full test details)	Henshaws Tubes - See Annex III for evidence.
	Resistance to ozone to be tested for 72hrs @ 30°C	Henshaws Tubes - See Annex III for evidence.
	Resistance to cold to be tested to -20°C according to ISO 4646	Henshaws Tubes - See Annex III for evidence.
	Minimum tear resistance of reinforced material as tested to ISO 4674 method A2 to be : 75 N	Henshaws Tubes - See Annex III for evidence.
	Coating adhesion to be tested to ISO 2411 with minimum adhesion value of: 58.3 N per 25mm	Henshaws Tubes - See Annex III for evidence.
	Seam strength to be tested by 50mm x 50mm test panel with minimum load: 58.3 N	Henshaws Tubes - See Annex III for evidence.
4.3	**Woods**	
4.3	Timber to be suitable for the marine environment	BS1088 marine plywood used
	All exposed timber to be given weathertight protection	All plywood is sealed.
	All plywood used shall be made from hardwood	BS1088 marine plywood used
	Plywood bonding adhesive to be waterproof and boil-proof	BS1088 marine plywood used
	Plywood to be free of sapwood, decay & imperfections.	BS1088 marine plywood used
4.4	**Metals**	
	To be fit for purpose and marine environment	Stainless steel only
4.5	**Glass-Reinforced Plastics**	
	To be compliant with EN ISO 12215-1.	Branded materials imported from Finland (Ahlstrom fibres & Aropol polyester resin)
5	**Functional Components**	
5.1	All tests to be conducted at 20°C +or- 3°C. If cords are used for testing, they shall have a minimum diameter of 8mm	
5.2	Load bearing hull fittings to hold a load of 2kN for 1 minute.	Randomly tested over time and satisfactory service history of over 300 boats proves strength.
5.4	**Valves shall be:**	

Builder's Plate (EN ISO 14945)

Material:	Metalic
Text:	12mm
Text Size:	min. 5mm
Pictogram Height:	min. 8mm
Location:	Transom
HIN:	☐ Show HIN on plate?



Vision from Helm Position - Horizontal - (EN ISO 11591)

	Description & Location of Steering Positions	Visibility Restricted?
Position 1	Central console	☐
Position 2	0	☐
Position 3	0	☐

4.1	**FIELD OF HORIZONTAL VISION FORWARD**	
4.1.1	Vision from 112.5 degrees starboard to 90 degrees port side without movement of more than 200mm of the helmsman's head from the eye position.	No obstructions in fwd sector
4.1.2	Vision from 90 to 112.5 degrees on the port side shall be provided without the helmsman leaving the helm. (i.e. <0.5m fwd of eye position).	No obstructions fwd of 122.5 degrees
4.1.3	Clear vision 15 degrees either side of line forward throughout the vertical range to the max distance in 4.1.5 as described above:	
	Fixed obstructions to vision in this area shall be such that clear vision can be maintained with movement of the head from the eye positions not exceeding 35mm in any direction.	No Notified Body has yet been able to explain the meaning of this requirement. It implies that obstructions within the fwd 30 deg arc must be narrower than 70mm yet this contradicts other requirements in this section - NoBos ignore this clause
	The total angle measured from the eye position subtended by fixed objects shall not exceed 8 degrees and the objects shall not overlap when viewed from the eye position.	No obstructions in this sector
4.1.4	From outside the clear area of vision as required in 4.1.3 but within area 4.1.1, no obstruction width > 100mm	No obstructions in this sector
	The total angle measured from the eye position subtended by fixed objects shall not exceed 30 degrees and the objects shall not overlap when viewed from the eye position.	
5	**FIELD OF HORIZONTAL VISION - ASTERN**	
5.1	**Craft without permanent cabin or other superstructure**	
	Vision aft to be provided through 135 degree arc, either side of CL without need to move more than 0.5m from seated eye position or 1m from standing eye position.	Only obstructionis stainless steel arch which has a tube thickness of 1.5" and thus 0.5m head movement is more than adequate.
5.2	**Craft with permanent cabin or other superstructure**	
	Mirrors or other means of seeing aft as in 5.1 shall be provided. If an autopilot is fitted, the helmsman may leave the helm position briefly to meet the requirements of 5.1.	N/A - no permanent cabin

Extract from Marine Guidance Note (MGN) 489

Maritime & Coastguard Agency

MARINE GUIDANCE NOTE

MGN 489 (M)

Pleasure Vessels - UK Regulations

Notice to all builders, owners, operators and skippers of pleasure vessels

Summary

This guidance note provides an overview of the Merchant Shipping legislation that applies to pleasure vessels, including rules relating to certification and manning requirements. The regulations apply to UK pleasure vessels wherever they may be and to non-UK pleasure vessels in UK waters. Additionally there is some best practice guidance provided.

This guidance note also sets out General Exemptions that provide alternative standards for the carriage of life-saving appliances and fire fighting equipment.

1. Introduction

1.1 Pleasure vessels are vessels used for sport or recreational purposes and do not operate for financial gain. A more extensive legal definition is provided by the Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) 1998 (SI 1998/2771), as amended. This definition is reproduced below:

"pleasure vessel" means-

(a) any vessel which at the time it is being used is:

(i)

(aa) in the case of a vessel wholly owned by an individual or individuals, used only for the sport or pleasure of the owner or the immediate family or friends of the owner; or

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

(ii) 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; or

(b) any vessel wholly owned by or on behalf of a members' club formed for the purpose of sport or pleasure which, at the time it is being used, is used only for the sport or

pleasure of members of that club or their immediate family, and for the use of which any charges levied are paid into club funds and applied for the general use of the club; and

(c) in the case of any vessel referred to in paragraphs (a) or (b) above no other payments are made by or on behalf of users of the vessel, other than by the owner.

In this definition "immediate family" means-

in relation to an individual, the spouse or civil partner of the individual, and a relative of the individual or the individual's spouse or civil partner; and "relative" means brother, sister, ancestor or lineal descendant;

1.2 This note provides advice and some detail on the legislation that applies to pleasure vessels. More specific information can be obtained by consulting the relevant legislation and guidance, available on the MCA website www.dft.gov.uk/mca or by contacting the MCA.

1.3 If more than 12 passengers[1] are carried, irrespective of whether payment is made, the vessel is a "passenger ship" under UK Merchant Shipping regulations and needs to be appropriately surveyed and certificated. If more than 12 passengers are intended to be carried, the MCA must be contacted through the nearest MCA Marine Office[2]. The local MCA Marine Office will provide guidance on the procedures and standards to be followed for a pleasure vessel intending to carry more than 12 passengers.

1.4 It is strongly recommended that these best practice guidelines are followed at all times, in addition to complying with the regulations this Note provides information on:

- **Get Trained** – It is sensible to undertake some form of training; if you do get trained you will be far less likely to be involved in a maritime incident. If you get into difficulty you will also know how to get the right help quickly, reducing the impact of your problem;
- **Check the weather and tides** – Always check the weather and tidal conditions before you set out so that you can prepare accordingly. At sea changes in tidal streams could make conditions worse, particularly if the wind and tide are against each other. Tidal heights may hide underwater hazards;
- **Wear a lifejacket** – a lifejacket that is properly serviced and maintained will significantly increase your survival chances if you fall overboard. It should be fitted with a light, whistle and spray hood and if possible crotch straps to stop the lifejacket riding up over your head;
- **Avoid alcohol** – If you have been drinking alcohol, your judgement will be impaired and you will be more likely to make mistakes, which at sea could be life threatening;
- **Keep in touch** – Tell someone responsible ashore where you are going and what time you expect to return so they are able to let the Coastguard know if you are missing; and

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[1] A passenger is any person carried in a ship, except;
a person employed or engaged in any capacity onboard the vessel and on the business of the vessel;
a person on board the vessel either in pursuance of the obligation laid upon the master to carry shipwrecked, distressed or other persons, or by reason of any circumstance that neither the master nor the owner could have prevented or forestalled; and
a child of under one year of age

[2] A list of the contact details for the MCA's Marine Offices can be found at:
http://www.dft.gov.uk/mca/mcga07-home/aboutus/contact07/marineoffices.htm

- **Wear the kill cord** – if your boat is fitted with a kill cord, please ensure the driver wears it. If the driver ends up falling overboard, it may help save their life and the lives of others who may also be in the water.

2 Definitions

2.1 Unless stated otherwise the following definitions shall apply throughout this guidance note.

"length" is as defined in the Merchant Shipping (Tonnage) Regulations 1997 (SI 1997/1510), which is:

the greater distance of the following distances –
(a) the distance between the fore side of the stem and the axis of the rudder stock; or

(b) 96 per cent of the distance between the fore side of the stem and the aft side of the stern;

the points and measurements being taken respectively at and along a waterline at 85 per cent of the least moulded depth of the ship. In the case of a ship having a rake of keel the waterline shall be parallel to the designed waterline;

"GT" means gross tonnage and a reference to gross tonnage -
(a) in relation to a ship having alternative gross tonnages under paragraph 13 of Schedule 5 of the Merchant Shipping (Tonnage) Regulations 1982 (SI 1982/841) permitted to be used pursuant to regulation 12(1) of the Merchant Shipping (Tonnage) Regulations 1997 (SI 1997/1510) is a reference to the larger of these tonnages; and

(b) in relation to a ship having its tonnage determined both under Part II and regulation 12(2) of those 1997 Regulations is a reference to its gross tonnage as determined under regulation 12(2).

3. Safety of Navigation for Pleasure Vessels

3.1 In section 3 of this note:

"length" in relation to a registered ship[3] means length defined in section 2.1 above and in relation to an unregistered ship means the length from the fore part of the stem to the aft side of the head of the stern post or, if no stern post is fitted to take the rudder, to the fore side of the rudder stock at the point where the rudder passes out of the hull;

3.2 On 1 July 2002, The Merchant Shipping (Safety of Navigation) Regulations 2002 (SI 2002/1473) came into force, which directly affect pleasure vessel users. These Regulations implement Chapter V (on Safety of Navigation) of the International Convention for the Safety of Life at Sea, 1974, otherwise known as SOLAS Chapter V. Most of the SOLAS Convention applies to large commercial ships, but parts of Chapter V apply to small, privately owned pleasure craft. Further information on SOLAS Chapter V can be found at https://mcanet.mcga.gov.uk/public/c4/solasv/index.html. This provides information on the rules for the safety of navigation that apply to pleasure vessels of differing sizes.

[3] A registered ship means a ship registered on the register of British ships maintained for the United Kingdom under section 8 of the Merchant Shipping Act 1995.

3.3 The following requirements apply to all vessels, irrespective of size. If you are involved in a boating accident and it is subsequently shown that you have not applied the basic principles outlined in this document, you may be breaking the law and could ultimately face prosecution.

3.3.1 Voyage Planning

3.3.1.1 SOLAS Regulation V/34 ('Safe Navigation and avoidance of dangerous situations') concerns prior-planning for your boating trip, more commonly known as voyage or passage planning. Voyage planning is basically common sense. As a pleasure vessel user, you should particularly take into account the following points when planning a boating trip:

- **Weather:** before you go boating, check the weather forecast and get regular updates if you are planning to be out for any length of time.
- **Tides:** check the tidal predictions for your trip and ensure that they fit with what you are planning to do.
- **Limitations of the vessel:** consider whether your vessel is up to the proposed trip and that you have sufficient safety equipment and stores with you.
- **Crew:** take into account the experience and physical ability of your crew. Crews suffering from cold, tiredness and seasickness won't be able to do their job properly and could result in an overburdened skipper.
- **Navigational dangers:** make sure you are familiar with any navigational dangers you may encounter during your boating trip. This generally means checking an up-to-date chart and a current pilot book or almanac.
- **Contingency plan:** always have a contingency plan in case something goes wrong. Before you go, consider places where you can take refuge should conditions deteriorate or if you suffer an incident or injury. Bear in mind that your GPS set is vulnerable and could fail at the most inconvenient time. This might be due to problems with electrical systems, jamming or interference with the signals or meteorological activity. It is sensible and good practice to make sure you are not over-reliant on your GPS set and that you have sufficient skills and information (charts, almanac and pilot book) to navigate yourself to safety without it should it fail.
- **Information ashore:** make sure that someone ashore knows your plans and knows what to do should they become concerned for your wellbeing. The MCA recommends joining the Coastguard Voluntary Safety Identification Scheme (commonly known as CG66) which is free and easy to join. The scheme aims to help the Coastguard to help you quickly should you get into trouble while boating. It could save your life. Join CG66 online at www.dft.gov.uk/mca/mcga07-home/emergencyresponse/mcga-searchand rescue/cg66.htm .

3.3.2 Radar Reflectors

3.3.2.1 Many large ships rely on radar for navigation and for spotting other vessels in their vicinity. So, whatever size your boat is, it is important to make sure that you can be seen by radar. SOLAS Regulation V/19 requires all small craft (less than 150GT) to fit a radar reflector or other means, to enable detection by ships navigating by radar at both 9 and 3 GHz 'if practicable'. This means if it is possible to use a radar reflector on

MAIB Safety Bulletin 1/2013

MAIB SAFETY BULLETIN 1/2013

Ejection of family of six from an 8.0m RHIB in the Camel Estuary leading to two fatalities and serious injuries to two people

Marine Accident Investigation Branch
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Southampton
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MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

MAIB SAFETY BULLETIN 1/2013

This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch is carrying out an investigation into the ejection of a family of six from a RHIB on 5 May 2013. The unmanned RHIB subsequently executed a series of tight high speed turns, running over members of the family in the water, causing two fatalities and serious injuries to two people.

The MAIB will publish a full report on completion of the investigation.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
Public Enquiries: 0300 330 3000

BACKGROUND

At approximately 1549 (BST) on Sunday 5 May 2013 a family of two adults and four children were ejected from their 8.0m rigid hulled inflatable boat (RHIB) into the water. They were manoeuvring the boat at speed in the Camel Estuary near Padstow, Cornwall, UK.

Some members of the family were subsequently run over by the RHIB, leading to the death of the father and the 8 year old daughter and serious injuries to the mother and the 4 year old son.

INITIAL FINDINGS

At this early stage in the investigation, the mechanism that led to the family being ejected from the RHIB into the water, is not clear.

The RHIB was fitted with a kill cord **(Figure 1)**, but this was not attached to the driver at the time of the accident. Consequently, when the driver was ejected from the boat, the kill cord did not operate to stop the engine and the RHIB continued to circle out of control, and at speed. As the RHIB circled, it ran over the family in the water a number of times, leading to the deaths and injuries. A few minutes later a local boatman was able to board the RHIB and bring it under control before further people were hurt.

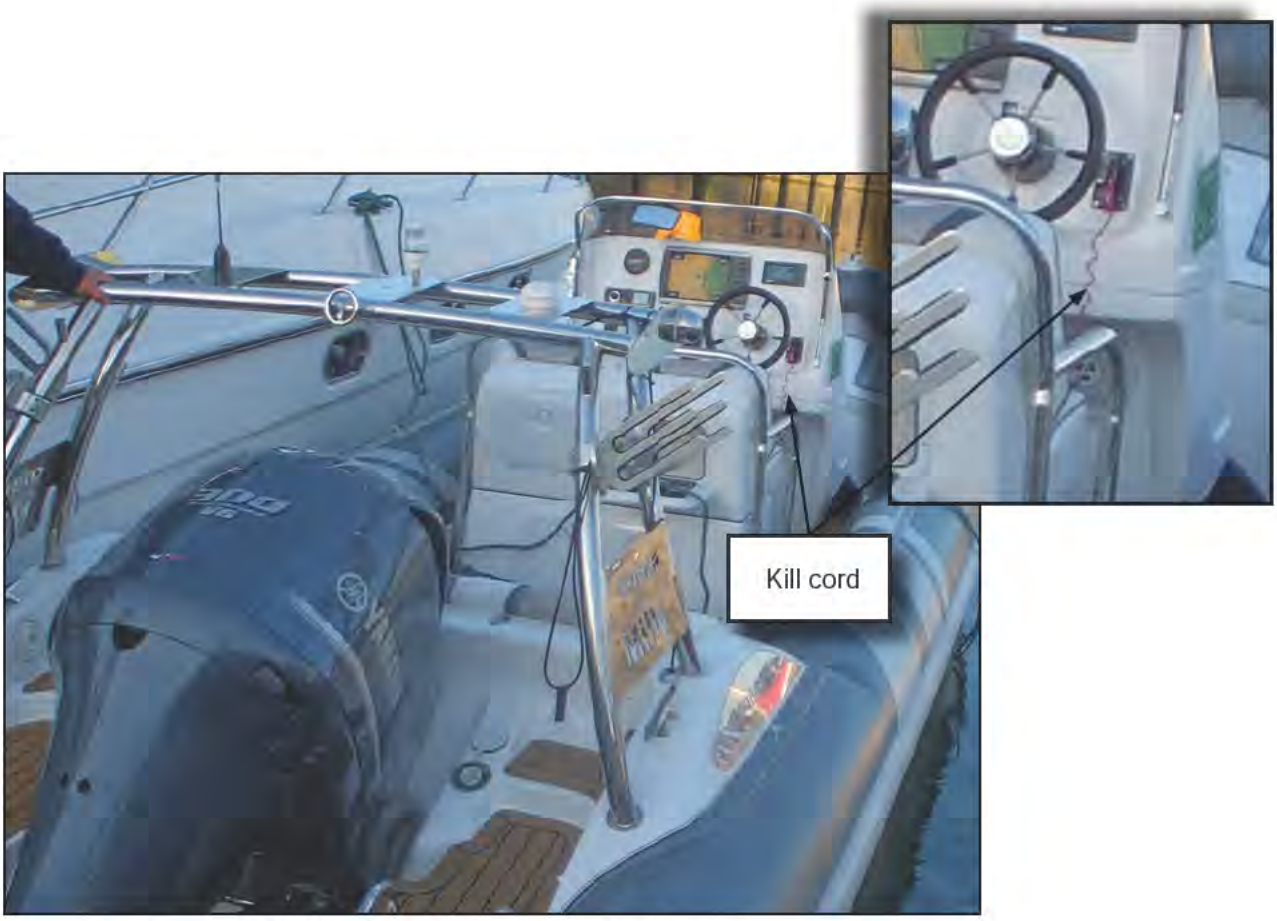

Figure 1: Boat with kill cord in place

SAFETY LESSON

The kill cord serves only one purpose, to stop the engine when the driver moves away from the controls. To ensure that this tragic accident is not repeated it is essential that all owners and operators of vessels fitted with kill cords:

- Test them regularly to ensure that the engine stops when the kill cord mechanism is operated.
- Make sure that the cord is in good condition.
- Always attach the cord securely to the driver, ideally before the engine is started, but certainly before the boat is put in gear.
- Stop the engine before transferring the kill cord to another driver.

Further information regarding the use of kill cords can be found at

http://www.rya.org.uk/go/killcord

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