Operator's Manual
(Technical)
for
J.Y. BOLEH

(This manual is based on the ISO 10240 format as relevant)

Boleh Can do
www.bolehproject.com

heritage lottery fund

CONTENTS

Introduction

This manual has been compiled to help the crew of the junk rigged yacht BOLEH operate the yacht in a safe and efficient manner. This manual is made up of two parts. The first part contains reference information and diagrams, the second part sets out the maintenance of BOLEH. Reference **must** also be made to the separate document 'Boleh Standard Operating Procedures'. To help with clarity some information may be included in more than one document.

Please read this manual carefully and familiarise yourself with the vessel before operation.

This manual is not intended as a teaching course on boat safety or seamanship. When operating BOLEH as a commercial sail training vessel it is imperative the person in command has the necessary experience and qualifications to meet the appropriate regulatory authority requirements. For BOLEH, these requirements are contained within the Maritime and Coast guard Agency Marine Guidance Note 'MGN 280(M) – The Safe Operation of Small Commercial Vessels in Commercial Use for Sport or Pleasure'. When operating commercially:

1 With up to 8 persons on board BOLEH must remain in areas that are within 60 miles of a safe haven (Category 2)
2 **Or** with up to 10 persons on board remain in areas that are within 20 miles of a safe haven and in daylight and fine weather only (Category 4).
3 Note that these categories also include voyages (with permanent crew only on board) to any location to pick up a new voyage crew etc which continues commercial operation.

This manual is not a detailed maintenance or trouble-shooting guide. For routine maintenance or repairs always employ a properly experienced boat builder or engineer. A separate set of maintenance manuals for BOLEH's systems and equipment has been provided (listed on Page 44) to assist suitably qualified personnel. **Always use trained and competent persons for maintenance, repair or modifications.**

All modifications that may affect the safety and strength characteristics of BOLEH are to be assessed, executed and documented by competent persons and the permission of the BOLEH Trust must be obtained before starting work (See Annex A in this section for list of contacts). The BOLEH Trust cannot be held responsible for any unauthorised modifications to the yacht, her equipment or rig.

BOLEH is a registered historic vessel and must always be maintained properly and all wear and tear that occurs made good. Proper repairs are to be made promptly in the case of accident or misuse of the vessel. All accidents and damage are to be recorded and reported to the BOLEH Trust as soon as possible. It will then be the responsibility of the BOLEH Trust to report the incident to the Heritage Lottery Fund.

BOLEH is a robust wooden yacht but can be severely damaged if not used properly. Always adjust the speed and direction of the yacht to suit the prevailing wind and sea conditions. When coming alongside, approach at a slow speed with ample fenders in place to avoid unnecessary damage to paintwork, equipment and woodwork.

BOLEH is equipped with a full complement of safety gear including training manuals and signs. Both the permanent and voyage crews are to be familiar with the use of all safety equipment and emergency manoeuvring (man-over-board recovery, towing etc) before leaving the dock or mooring.

All persons when sailing are to wear the lifejacket and safety harness provided on board. Safety harnesses must be clipped to the deck jackstays when on deck at night and in bad weather or as directed by the person in command of BOLEH.

A number of warning and information labels are fitted throughout the yacht which must be followed when operating and maintaining BOLEH.

Please keep this manual in a secure place on board and make all the crew aware of its location and contents.

PART 1

REFERENCE INFORMATION

PART 1 CONTENTS

1.1 Background

BOLEH is a 12.15 metre (40ft) long wooden yacht designed by former Naval Commander Robin Kilroy DSC while serving in Singapore. The distinctive design of the hull and rig was influenced by the dhows, junks and other sailing craft Commander Kilroy saw during his service with the Fleet Air Arm in the Far East between the Wars.

BOLEH was constructed in 1949 by Malay shipwrights and sailed back to the UK by Robin Kilroy, fellow Naval Officers, an Admiralty shipwright and a Chinese cook. A copy of Robin Kilroy's book *'BOLEH'* describing the build and voyage is held on board. Registered in Salcombe, BOLEH became a sail-training vessel for sea cadets, Island Cruising Club trainees and young soldiers.

Following various changes of ownership, the yacht was the victim of an arson attack whilst in the final stages of a refit in Rye. She was subsequently purchased and rebuilt by a local joiner and keen sailor, Roger Angel, who took her to Mallorca in the 1980s. Dave Sully, a friend of Roger Angel, recorded this period of BOLEH's life in the book *'Arising from the Ashes'*, a copy of which is also held on board.

In 2008 BOLEH was purchased by Commander Kilroy's family and brought back to Portsmouth where the BOLEH Trust (Registered Charity 1175954) was formed to restore her and return her to her previous role as a sail-training vessel. The Trust succeeded in a bid with the Heritage Lottery Fund to provide funding to restore BOLEH at workshops in Eastney, Portsmouth. During the restoration of BOLEH, the Trust employed six apprentices who gained practical experience in conservation and shipwright skills. The BOLEH Trust completed the restoration in the summer of 2015.

BOLEH means "can do" in Malay and it was this philosophy that drove the Trust to restore BOLEH and put her to work training and inspiring young people.

BOLEH is now listed as a Historic Vessel, Certificate No. 2281, with the National Historic Ships Register.

1.2 Certifications

BOLEH is certified as a small commercial sailing vessel under the Maritime and Coast guard Agency Marine Guidance Note 'MGN 280(M) – The Safe Operation of Small Commercial Vessels in Commercial Use for Sport or Pleasure'.

BOLEH has dual certification and can operate **either**:
As a Category 2 vessel carrying up to 8 persons up to 60 miles from a safe haven;
Or
As a Category 4 vessel carrying up to 10 persons up to 20 miles from a safe haven in good weather and during the hours of daylight.

The coding must be properly maintained and must include an annual inspection by a suitably qualified surveyor.

2 Description of Junk Yacht BOLEH

2.1 Main Particulars

Length Overall	12.15 metres 39′-10″
Length Waterline	9.75 metres 32′-0″
Depth	2.72 metres 8′-11″
Beam Max.	3.82 metres 12′-6″
Gross & Nett Tonnage	17.82 tons
Draft	2.07 metres 6′-9″
Displacement	16.25 tonnes (Maximum)
Official Number	179975
Radio Call Sign	2IVF6
MMSI Number	235113075
AIS	Class B Transmit and Receive

2.1.1 Auxiliary Propulsion

2 x Electric Motors	LMC Marlin 13 13kW each
Reduction Ratio	3.2:1
2 x Fixed Pitch Propellers	430mm Diameter

2.1.2 Generator information

1 x 23kVA 3ph Beta Marine Diesel Driven Generator Set
When ordering spare parts quote:

WOC Number	K30389
Engine Type	BG1505
Engine Number	CC2944

2.1.3 Electrical Installations

230V AC Domestic Circuit
72V DC Motor Drive Battery Bank 74Ah
72V to 12V 300W DC-DC Converter
12V DC Generator Start Battery (Emergency Supply)
12V DC Lighting, Pumps and Navigation Circuits

2.1.4 Tank Capacities

Fuel Oil (Diesel)	126 litres
Fresh Water	200 litres
Holding Tank	53 litres
Hot Water Cylinder	20 litres
Reserve Fuel Storage x 2	75 litres each (not connected to system)

2.1.5 Slipping and transport

BOLEH has a long flat keel and can, if necessary, be 'dried-out' alongside a quay wall or piles. The normal precautions must be observed when grounding:

a) The quay or piles are strong enough to take the weight.
b) The ground under the keel is firm.
c) Substantial fendering placed against the wall or piles.
d) Only take the ground in calm conditions.
e) BOLEH is heeled towards the wall using weights on the side deck.

BOLEH can also be lifted by a Travelift (at least 20 tonne capacity) sling type arrangement or by crane and slings.

The flat keel on BOLEH extends from the aft end of the cockpit to the forward end of the deckhouse. The longitudinal centre of gravity is approximately at the liferaft stowed position.

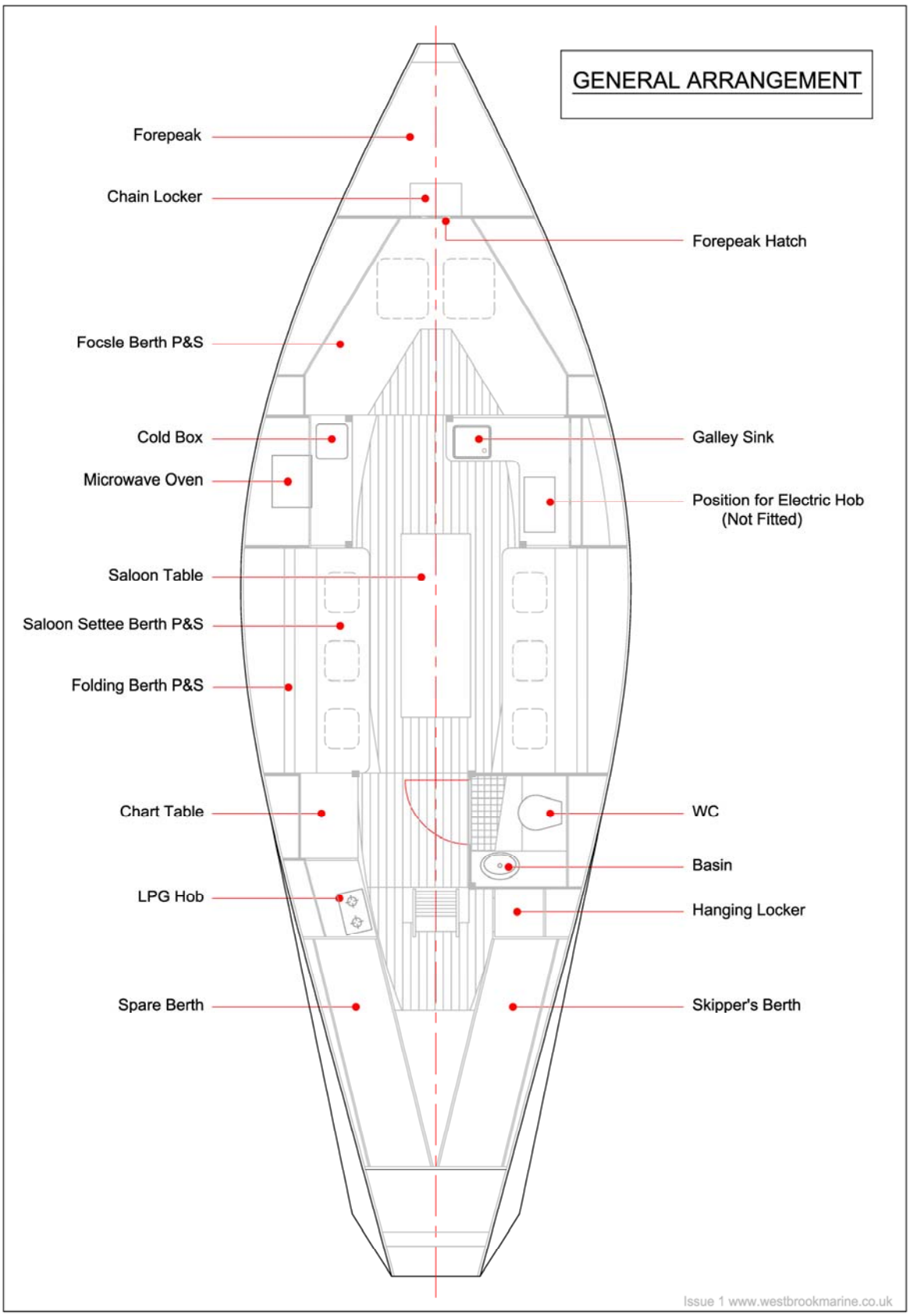
1. MEASUREMENTS

L.O.A.	12.15 metres	39'10"
L.W.L.	9.75 metres	32'
Beam	3.82 metres	12'6"
Draft	2.07 metres	6'9"
Displacement	16.25 tonnes	16 tons
Depth	2.72 metres	8'11" (Underside of keel to top of deck amidships)
Sail Area	61.9 sq.metres	666 sq. ft.
Quadruped Masts	10.15 metres	33'4" (Length of aft masts)
Yard (Topmast)	9.19 metres	30'1"
Air Draft	14.73 metres	48'4"
Boom	5.94 metres	19'6"

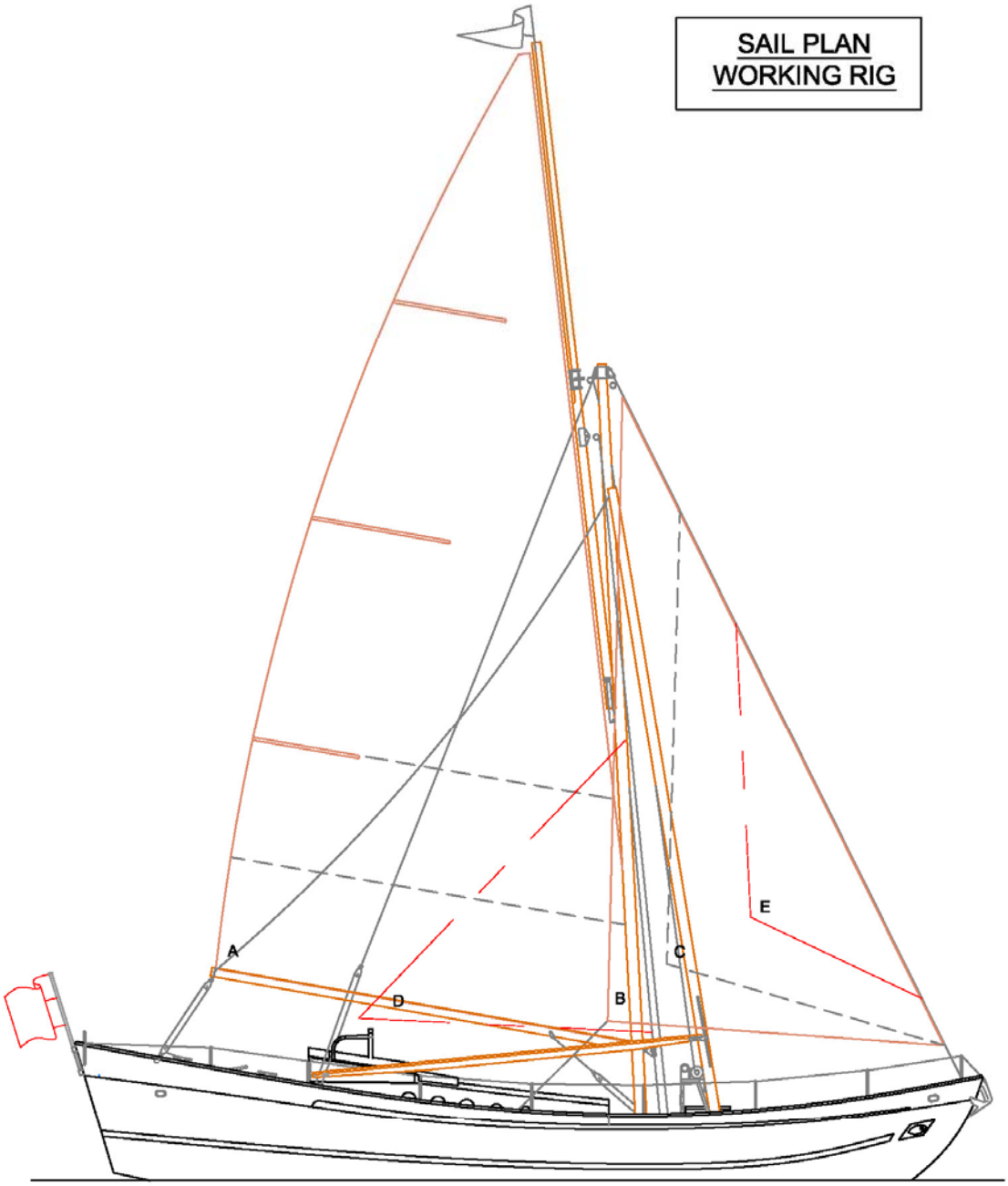
2. GENERATOR & MOTORS

Generator - Beta Marine BetaSet 22/2, 3 Phase, 23.1kVA (See Handbook)
Electric Motors – 2 x LMC Marlin 13 13kW each
Continuous speed in calm water 4.5 knots (approx.)
Fuel consumption at continuous speed – 5.8 litres/hour.
Capacity of Main Fuel Tank – 126 litres (18 hours motoring with 10% reserve)

2.2 General Arrangement Plan



2.2.1 Sail Plans



	SAIL	LUFF	FOOT	LEACH	AREA		MATERIAL	REMARKS
A	WORKING MAIN	13.35m.	5.77m.	12.90m.	43.4 sq.m.	467 sq.ft.	Spun Polyester	Colour White
B	No 1 GENOA	9.82m.	4.73m.	8.38m.	19.8 sq.m.	213 sq.ft.		Two Off - Colour White
C	No 2 JIB	8.01m.	3.89m.	6.09m.	11.5 sq.m.	123 sq.ft.		Colour Tan
D	STORM TRYSAIL	3.29m.	3.94m.	5.16m.	8.3 sq.m.	89 sq.ft.		Colour Orange
E	STORM JIB	5.62m.	2.54m.	3.95m.	4.9 sq.m.	53 sq.ft.		Colour Orange
F	CRUISING CHUTE	Details to be determined						

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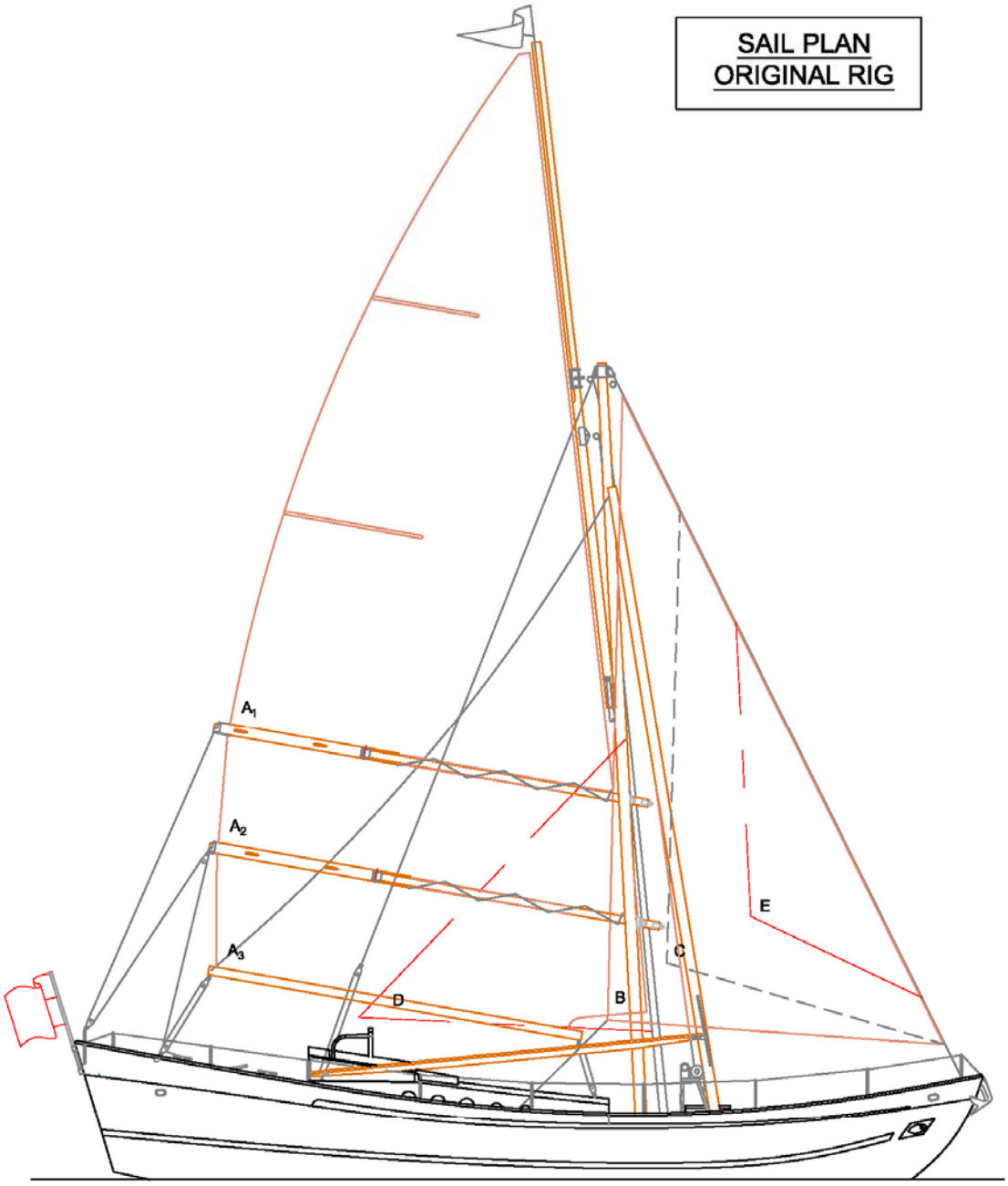
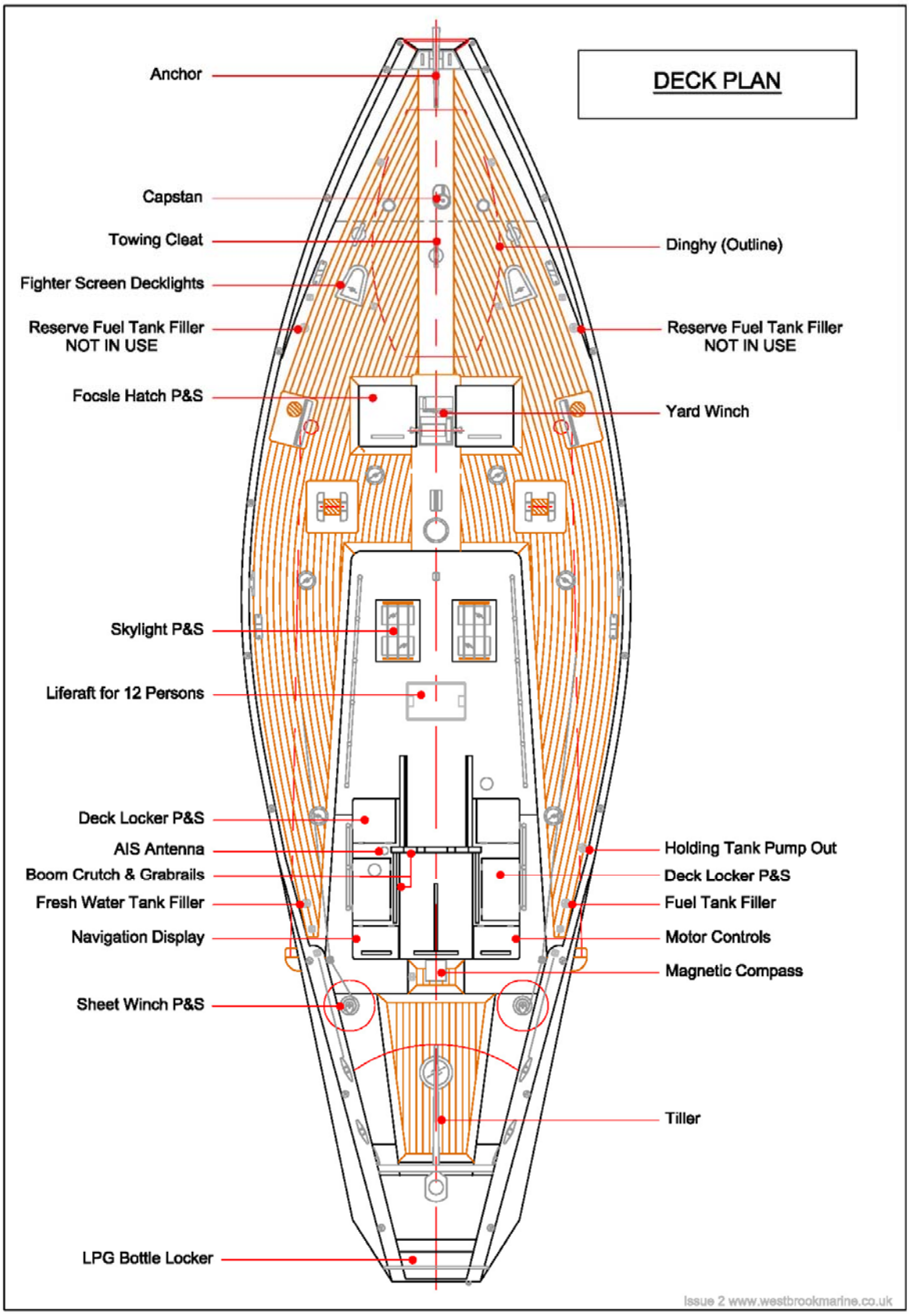
SAIL PLAN
ORIGINAL RIG



	SAIL	LUFF	FOOT	LEACH	AREA		MATERIAL	REMARKS
A	ORIGINAL MAIN	13.35m.	5.77m.	12.90m.	47.1 sq.m	507 sq.ft.	Spun Polyester	Three Panels - Colour Tan
B	No 1 GENOA	9.82m.	4.73m.	8.38m.	19.8 sq.m	213 sq.ft.		Two Off - Colour White
C	No 2 JIB	8.01m.	3.89m.	6.09m.	11.5 sq.m	123 sq.ft.		Colour Tan
D	STORM TRYSAIL	3.29m.	3.94m.	5.16m.	8.3 sq.m.	89 sq.ft.		Colour Orange
E	STORM JIB	5.62m.	2.54m.	3.95m.	4.9 sq.m.	53 sq.ft.		Colour Orange
F	CRUISING CHUTE	Details to be determined						

2.2.2 Deck Plan



2.3 Rig, Sails and Auxiliary Motors

2.3.1 Rig

BOLEH has an unconventional mast and spar arrangement and should only be taken to sea after familiarization with all aspects of the rig.

BOLEH has four deck stepped masts set up in a quadruped fashion. The two aft masts are located in tabernacles and the forward masts locate in hardwood chocks. The whole assembly is secured with twin forestays and running backstays. The use of a quadruped mast reduces the amount of standing rigging significantly over that of a more conventional rig.

2.3.2 Sails

Conventional triangular shaped headsails can be set on either or both of the wire forestays depending on wind strength and direction.

There are two possible arrangements for the mainsail, namely:

a) A conventional triangular mainsail set on a 'long' boom.
b) A copy of the original (or 'ceremonial') mainsail consisting of three parts separated by wishbone booms between and a 'short' boom below.

The mainsails extend above the quadruped mast and are supported by a near vertical yard. The yard is hoisted and lowered (but remains upright) by means of a pedestal mounted hand operated winch.

2.3.3 Auxiliary Motors

For auxiliary propulsion BOLEH has two 72 volt electric motors that drive feathering propellers through a reduction belt drive. These motors are sealed and require no day-to-day maintenance. Drive belt tension can be adjusted simply by slackening the four motor retaining bolts and moving the motor up or down to suit using the central adjustment nut. The propeller shafts are fitted with non-drip seals which similarly require no maintenance during the sailing season. Outside the hull the shafts are fitted with zinc anodes and rope cutters.

The motors are operated by a key switch and twin marine type throttles mounted in a locker at the forward end of the cockpit on the starboard side.

The throttle control varies the speed of the motors via Sigma programmable controllers which are mounted behind the outboard lining of the hanging locker. In normal operation, these units require no attention or maintenance. However, motor characteristics such as the speed 'ramp-up' and ramp-down' intervals can be modified via a hand programmer provided on board.

Warning – Changes to motor characteristics using the hand programmer must only be made by suitably trained persons – severe damage to batteries, controllers and motors can result from unauthorised changes to controller settings.

For all normal auxiliary motor operation, the generator set must be running and both main chargers switched on. The generator is used to 'float' the batteries and the period of motor running up to 5 knots is only restricted by the amount of diesel fuel available. Using 90% of the available full fuel (126 litres), the endurance will be about 18 hours.

The motors may be operated 'silently' via the 72 volt battery bank for short periods at part throttle but the total period of running must be restricted to a maximum of 45 minutes at no more than 3 knots. **Longer periods or higher speeds will deplete the battery charge to an unacceptable level**. Before running on batteries only the charge state of the batteries must be checked using the level gauge shown on the motor display panel.
Initial battery charge must be full before leaving harbour or when operating solely under battery power

Motor Temperatures

Both electric motors are mounted in a force ventilated box at the base of the companionway ladder. The motor box ventilation fan will start automatically when the motor key switch is turned on. **It is important that the ventilation openings are not obstructed**. Each motor is fitted with a temperature sensor, digital read-out and an alarm. The alarm will sound if the operating temperature reaches an unacceptable level (70°C)**. If the alarm sounds the motor power must be reduced as soon as possible**. Removing the companion ladder and lifting the motor box cover will normally quickly reduce the motor temperature to a safe level. Note that the motors are self-ventilating and can be operated again to aid further cooling when the temperature has dropped below the alarm point.
It is recommended that after motor operation the motor On/Off switch is left on for 5 to 10 minutes to allow the ventilation fans to remove residual heat in the motor bodies.

Motor Operation

The following diagram is a guide for motor operation using the %V value (i.e. the percentage of the 72 volts sent to the motors) shown on the cockpit motor display, a typical view also shown below. The chart shows propeller revolutions, current consumed (Total Amps) and boat speed in relation to %V. Speed is only an indicative value and will depend on prevailing wind and sea conditions. Also shown are the limits of operation when using 'silent' mode, one charger and both chargers. Normal operation with the generator running is the green shaded area between the two bold lines on the chart. This ensures that the batteries remain charged and their working life span is maximised. Battery re-charge times (motors off) will be between 50 and 70 minutes depending on the depth of discharge of the batteries.

'BOLEH' Auxiliary Motor Operation

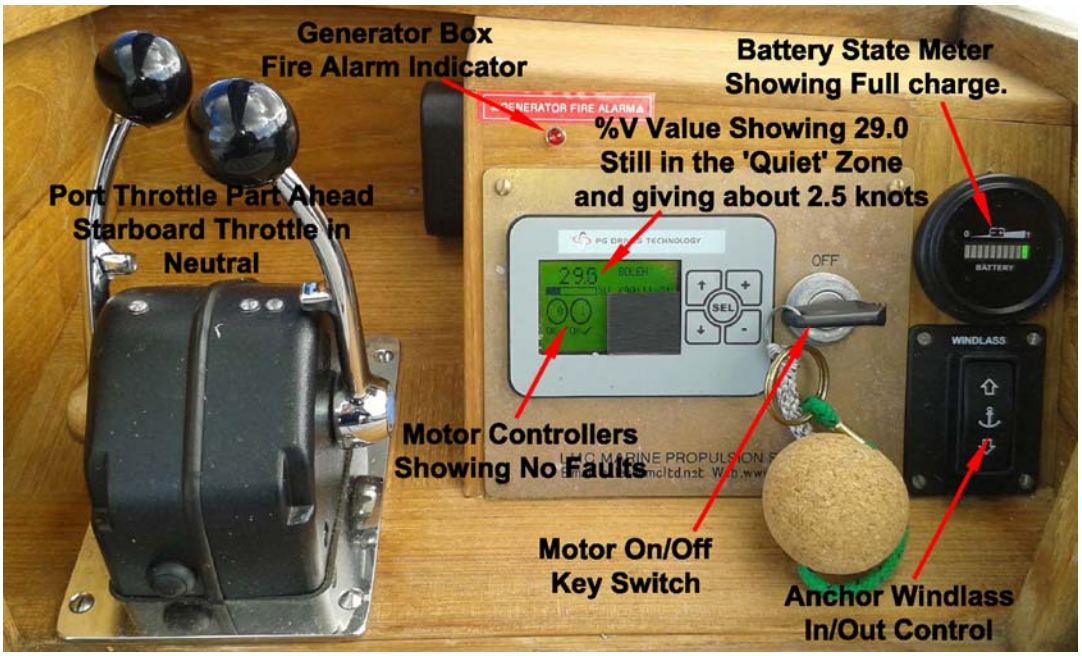
%V	Prop Revs	Total Amps	Speed	
10	101	5	0.8	
15	151	10	1.3	
20	202	17	1.7	
25	252	25	2.1	
30	302	35	2.6	
35	353	46	3.0	One Charger Operation
40	403	59	3.4	
45	454	74	3.8	
50	504	90	4.2	Two Charger Operation
55	554	108	4.5	
60	605	128	4.8	
65	655	149	5.1	
70	706	172	5.4	
75	756	196	5.7	
80	806	222	5.9	
85	857	250	6.1	
90	907	279	6.4	
95	958	311	6.6	
100	1008	343	6.7	

'Quiet' Power - Max 45 minutes to 50% discharge

Continuous with Generator Power

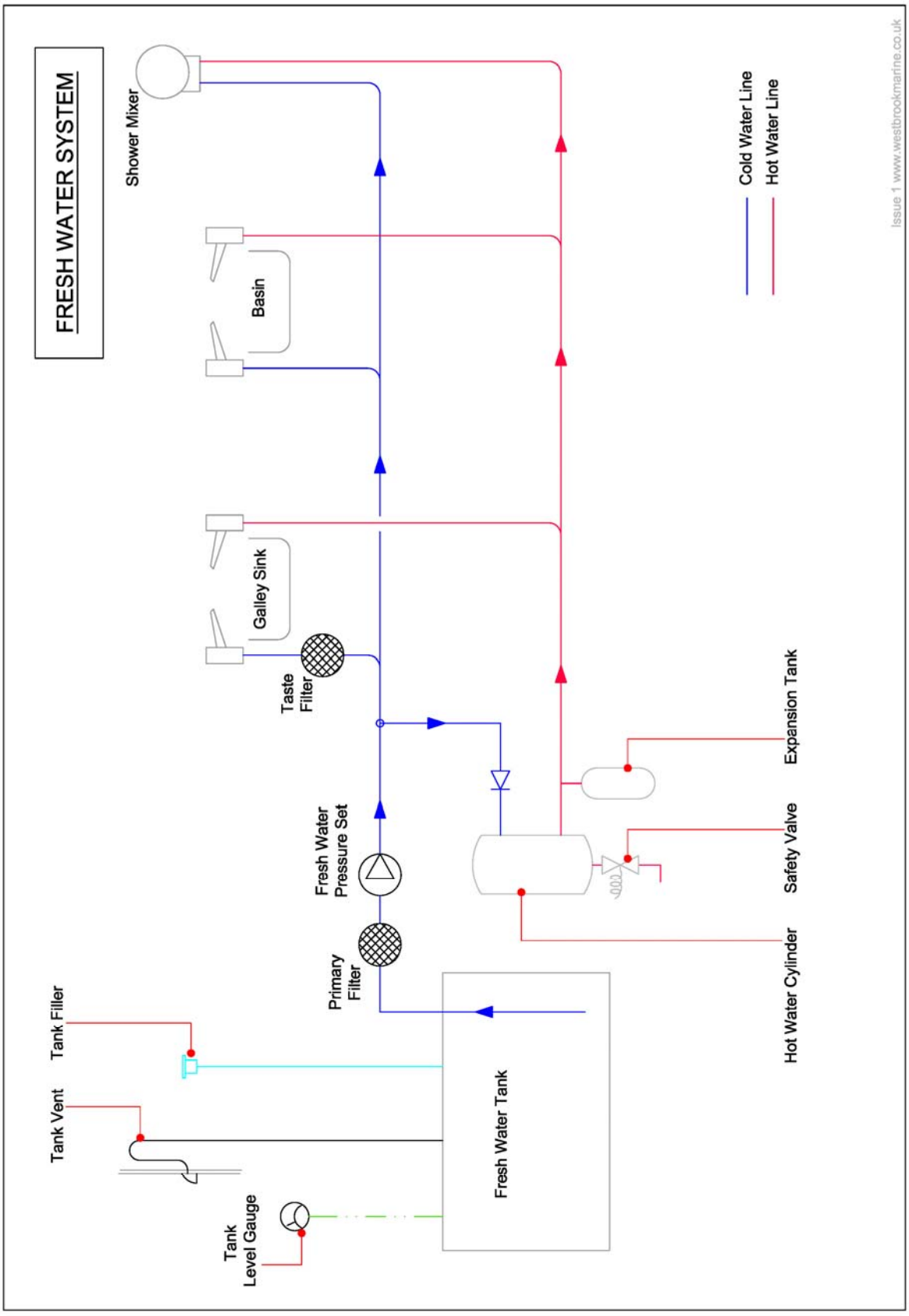
Intermittent use - Max 15 minutes to 50% discharge

All figures require batteries to be fully charged at outset.
Do not exceed 80% discharge at any time.
Boat speed is in calm conditions.

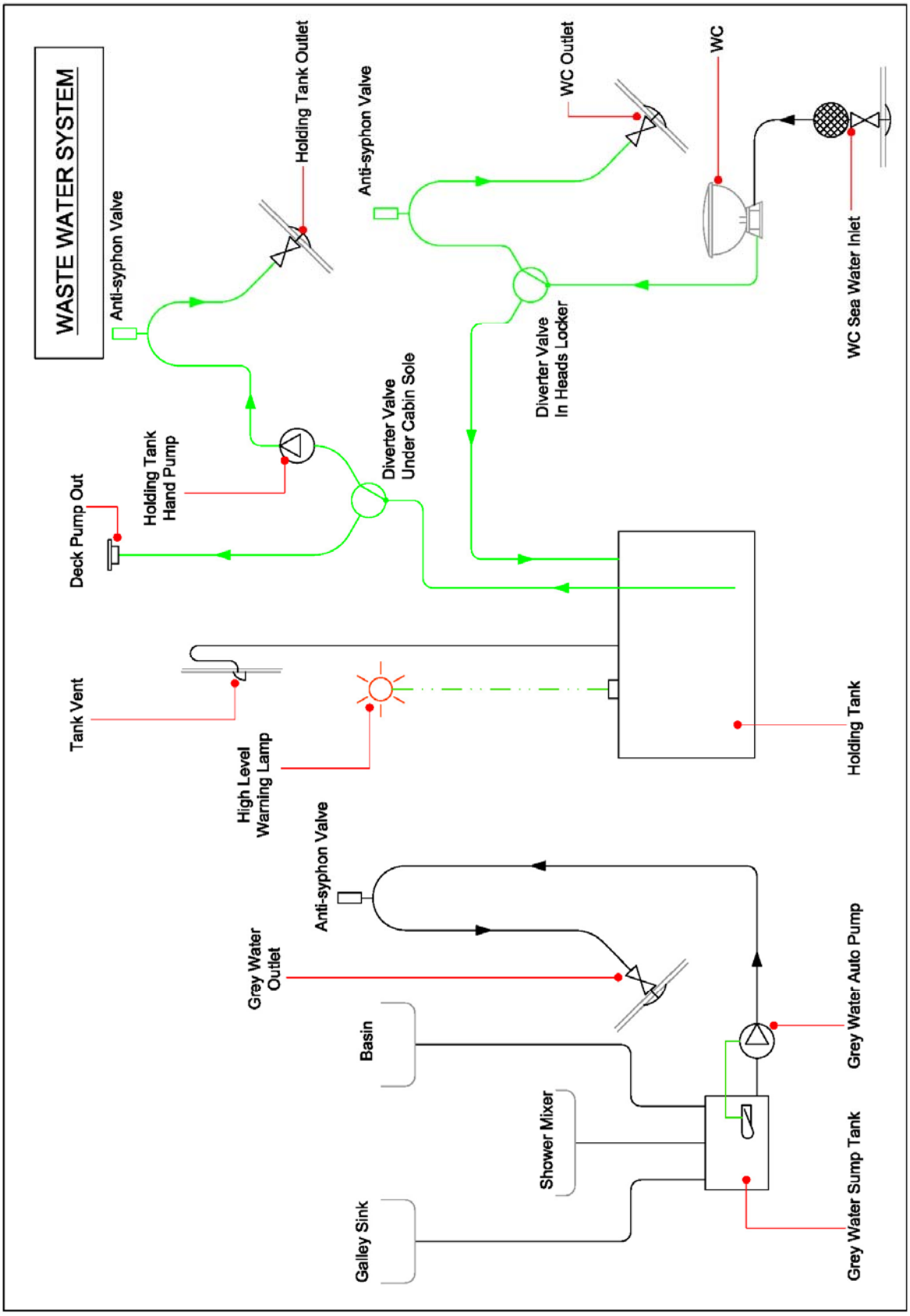


3 Engineering & Electrical Systems

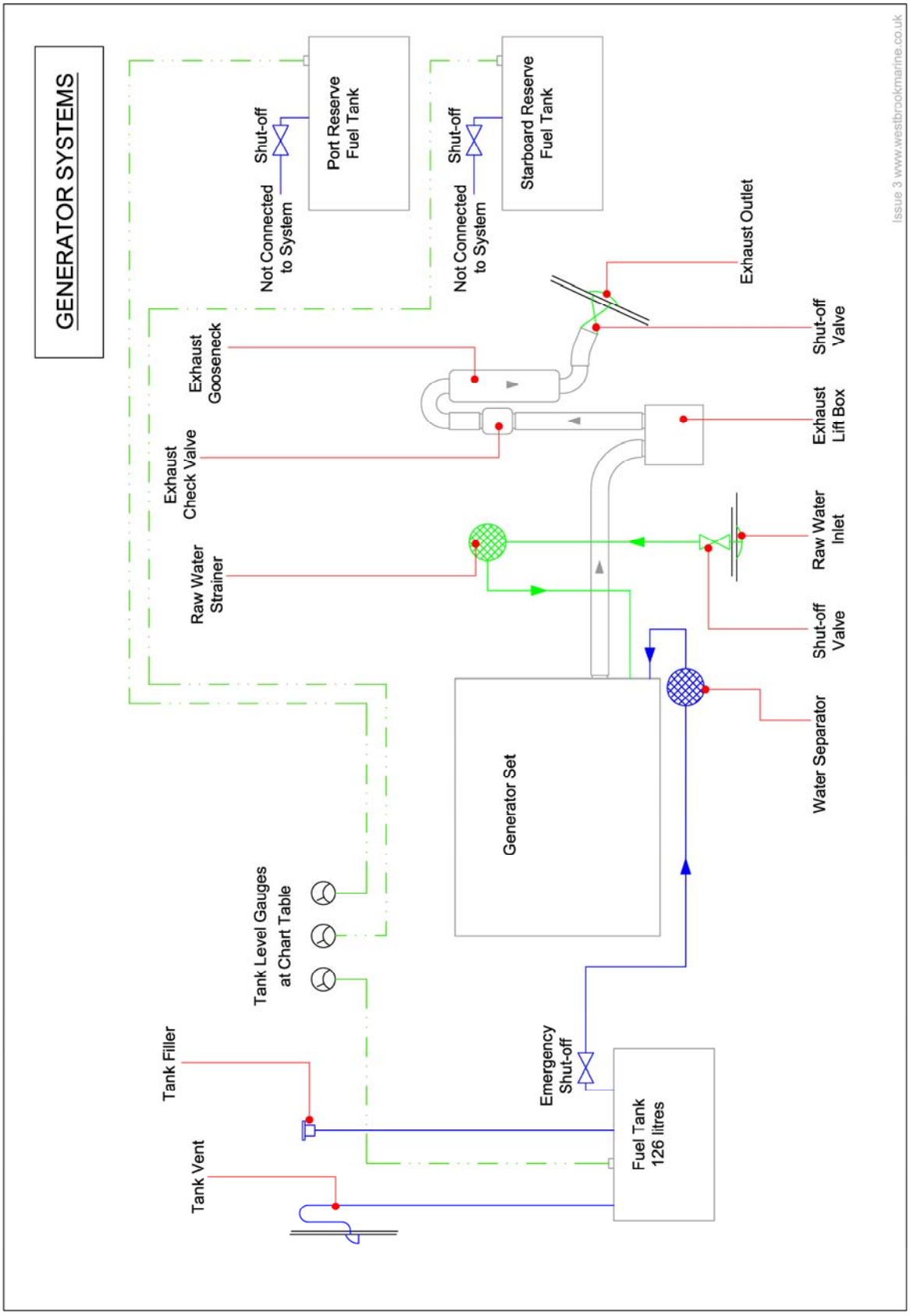
3.1 Fresh Water System



3.2 Waste Water System



3.3 Generator Set Systems



3.4 Steering

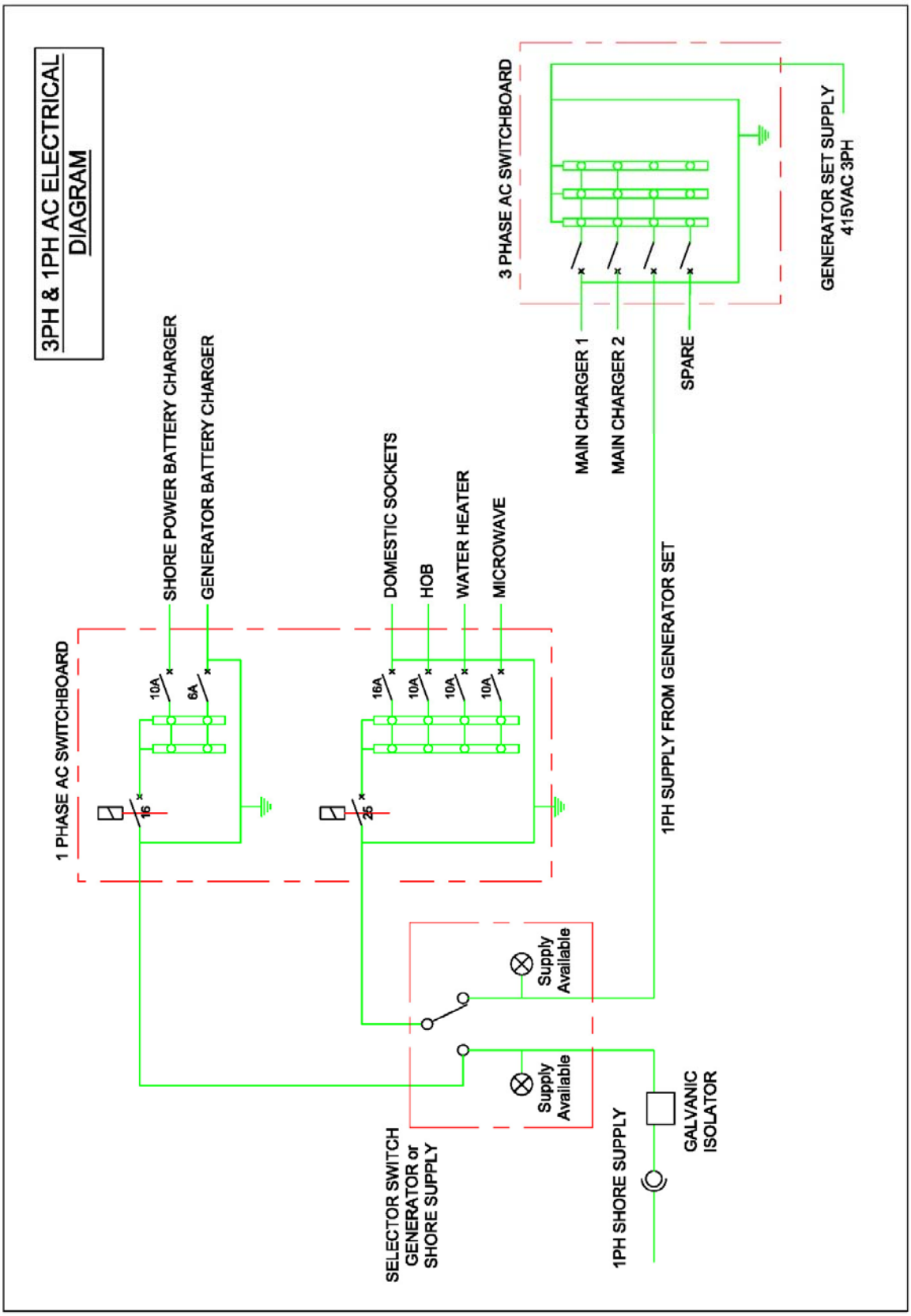
BOLEH has a traditional style transom hung rudder operated by a laminated wood tiller.

The rudder has a roller bearing at the top which must be kept well-greased and has a pintle with a plain bearing at the base.

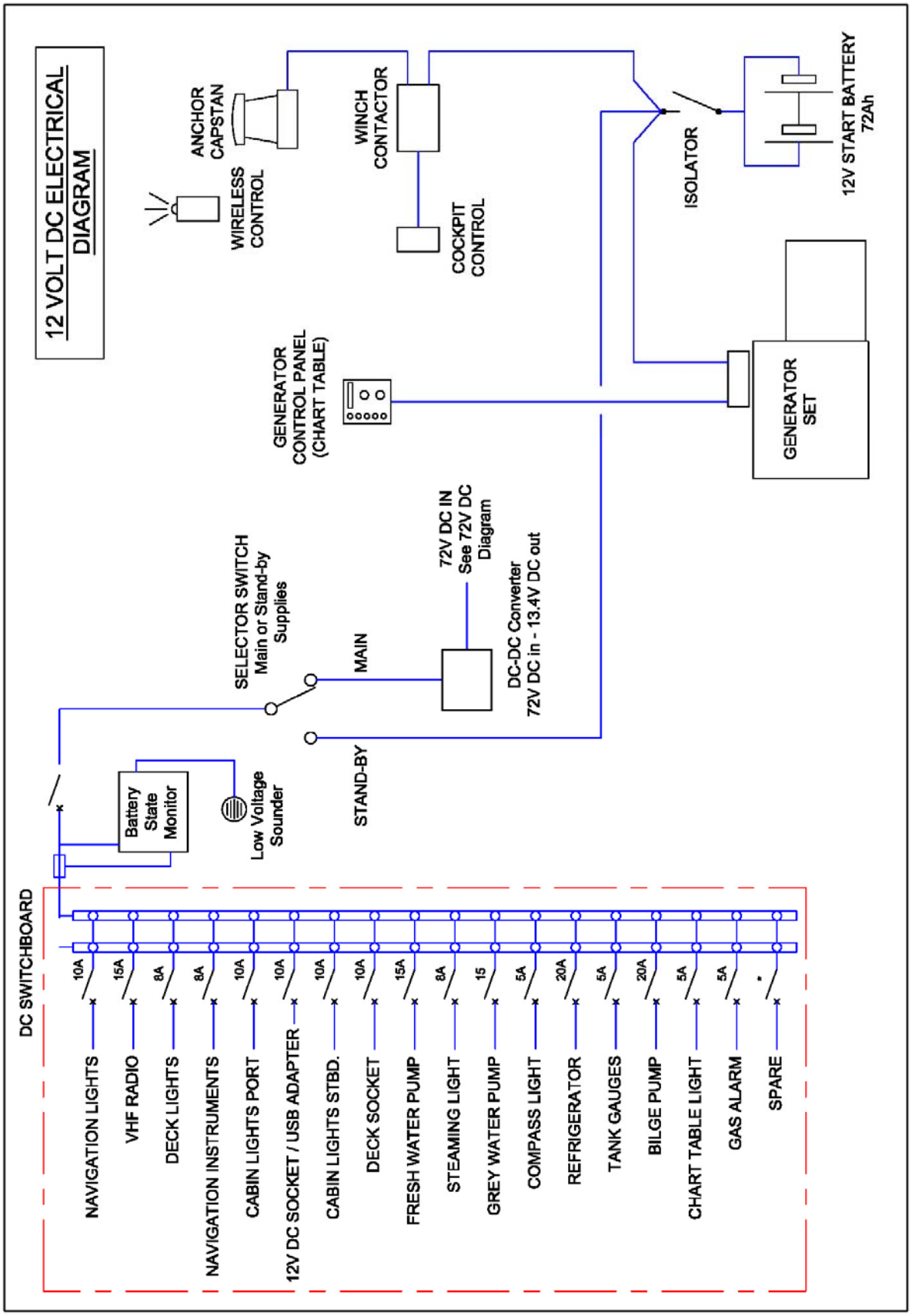
There is an emergency spare tiller stowed in the hanging locker which can be fitted by removing the hex head bolts and plate at the top of the rudder stock. A suitable spanner is taped to the emergency tiller to facilitate this operation.

3.5 The Electrical Systems

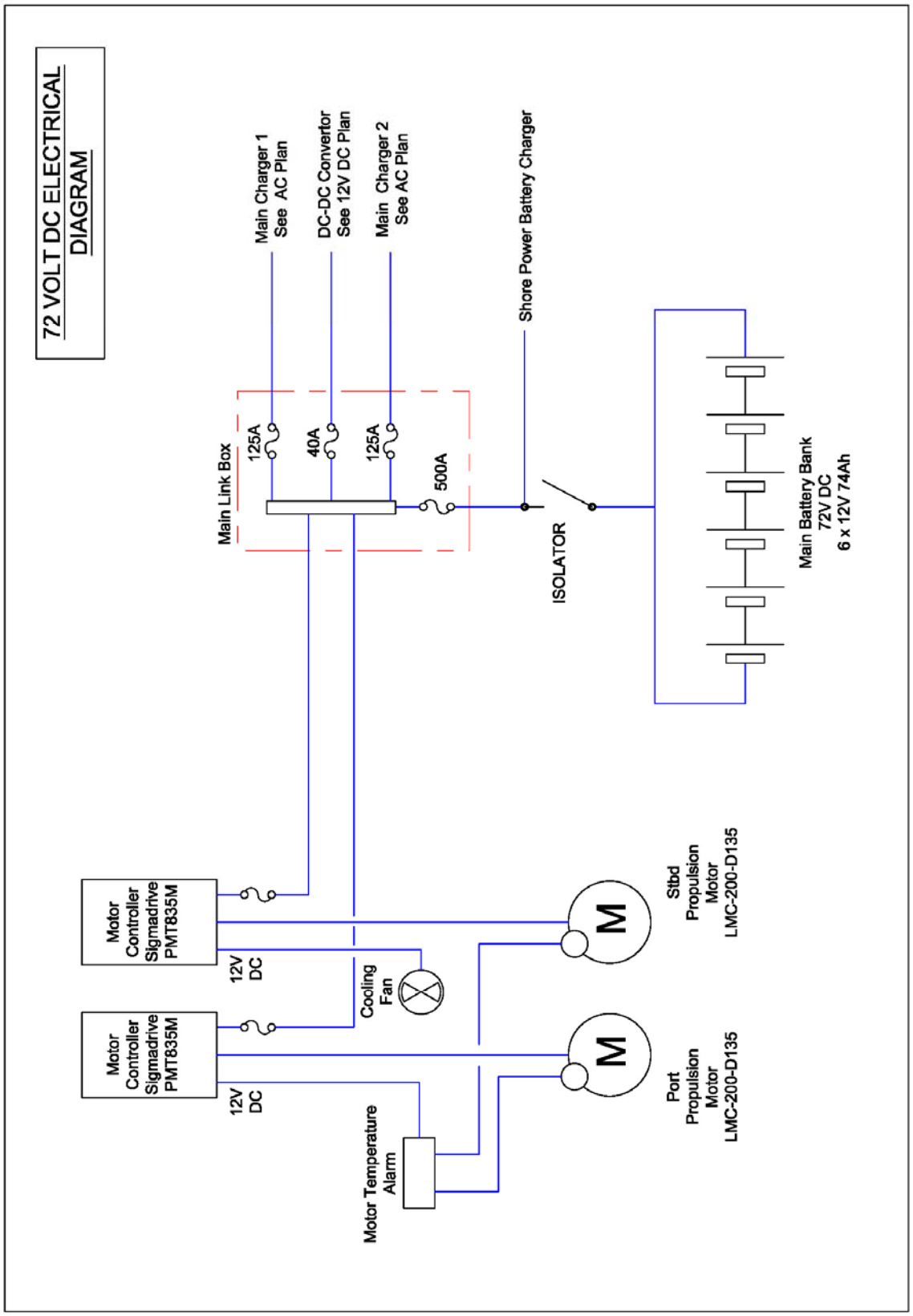
3.5.1 The AC Electrical System



3.5.2 The DC installation 12V



3.5.3 The DC installation 72V



3.5.4 Batteries

BOLEH is fitted with a main battery bank in a box under the Skipper's berth consisting of six 12 volt lead acid batteries connected to give an output of 72 volts.
The batteries are spill proof and maintenance free so require no topping up of electrolyte and are safe even up to very large angles of heel.
The only regular maintenance required is to check that the terminals are clean and tight and the cables and terminal boots undamaged.

Extreme caution must be taken when accessing the battery tops to ensure no metal can cross connect the terminals as very large energy discharges can occur if terminals are accidently short circuited by spanners or other metal objects.

The main battery bank is normally charged by the generator set via a pair of 'intelligent' type battery chargers mounted under the chart table. The time taken to re-charge (assuming no other battery demand) from a 50% discharge **(recommended minimum level of discharge)** is about 50 minutes. To re-charge from an 80% discharge **(maximum acceptable level of discharge)** will take about 70 minutes.

When connected to the 240v AC shore supply the batteries can be charged from a 72 volt dedicated charger sited under the mate's berth. This charger is switched on using the labelled breaker on the main AC distribution box under the chart table. **This charger is not to be left on when Boleh is unattended and the battery charger is to be turned off as soon as the batteries are fully charged.** It has been found that in normal operation the use of this charger is seldom required.

Always check the batteries are fully charged when taking over the yacht or before leaving harbour.

The 72 volt DC system supplies the 12 volt DC system via a 300 watt voltage dropper.

The generator set is started using a dedicated 12 volt battery sited in a box under the galley sole. This battery also supplies power to the anchor capstan. The battery charge is maintained by a small alternator on the generator set when the set is running or by a dedicated battery 'minder' when BOLEH is connected to shore supply. The generator battery is fitted with a charge indicator and low level alarm sounder on a display at the chart table.

For emergency use, should the normal 12 volt DC supply from the DC-DC unit fail, the generator set battery can supply the main 12 volt DC system by operating the change-over switch at the chart table. Use the emergency supply only for essential services such as the VHF radio and navigation lights and **for a period of one hour maximum.**

Regular attention must be paid to the charge state of both battery banks using the indicator and alarm provided at the chart table and on the motor control panel. Note that it may take up to 70 minutes of generator set

running to re-charge the main batteries especially if motoring under batteries alone has occurred.

In the event that the generator start battery charge is too low to start the generator, use the leads stowed in the aft cabin to obtain a 'jump start'.

1. **Turn off the main and generator battery master switches.**
2. **Select one battery from the main battery bank and disconnect the positive (red +) terminal connection and isolate. Clamp one end of the red 'jump' lead to the positive (red +) terminal.**
3. **Lay out the red lead alongside the saloon table port side and clamp second end to the positive (red +) terminal of the generator battery.**
4. **Repeat for the black 'jump' lead, starboard side and two negative (black -) terminals.**
5. **Switch on the generator master switch and start generator as normal.**
6. **When the generator is running disconnect both leads in the reverse order as described above.**
7. **Ensure the main battery bank is still switched off and re-connect the positive (red +) battery cable. Switch on the main battery bank.**

3.5.5 Important warnings on the DC systems

BOLEH has 72V DC and 12V DC electrical systems.
The DC systems are totally self-contained and require no day-to-day access for operational maintenance or attention. Components and boxes labelled as part of the DC systems are only to be opened by suitably qualified persons and with the supply disconnected.

Skipper and crew operation of the DC systems must be confined to switching the circuit breakers on the face of the control panels at the chart table.

3.5.6 Important warnings on the AC systems

BOLEH is fitted with both 3 phase and single phase AC electrical systems. Each system has user safety protection by means of an RCCD (residual current control devices).
The AC systems are totally self-contained and require no day-to-day access for operational maintenance or attention. Components and boxes labelled as part of the AC systems must only be opened by suitably qualified persons and with the electrical supply disconnected.

Skipper and crew operation of the AC systems must be confined to switching the circuit breakers in the distribution box and the AC selector switch under the chart table.

3.5.7 Navigation Equipment

BOLEH is fitted with GPS based navigation system comprising of a multi-function display mounted in a deck locker on the port side at the forward end of the cockpit.

The display is a Raymarine e95 with built-in GPS antenna and can display electronic charts, boat speed, water depth and wind data. For full operating instructions please refer to the manual supplied by the manufacturer.

By downloading and installing the free Raymarine mobile apps on smart phones, laptops and tablets the multifunction device information can be accessed anywhere on BOLEH through the Raymarine in-built Wi-Fi setup. Most devices will detect the multifunction device signal automatically and no special codes are required to connect.

A combined speed and log transducer is fitted beneath a small hatch in the cabin sole to starboard of the generator box. The transducer can be lifted out to clear weed or other jam. **Be sure to fit the blanking plug (stowed at the base of the chart table instrument panel) when removing the transducer whilst afloat.**

BOLEH is also fitted with an active Class B AIS (automatic identification system) with a dedicated GPS antenna. This unit enables BOLEH to see and be seen by other vessels on electronic charts. BOLEH can also be tracked afloat or ashore by using a tracking app or program such as those found at www.marinetraffic.com for example.

3.5.8 Communications Equipment

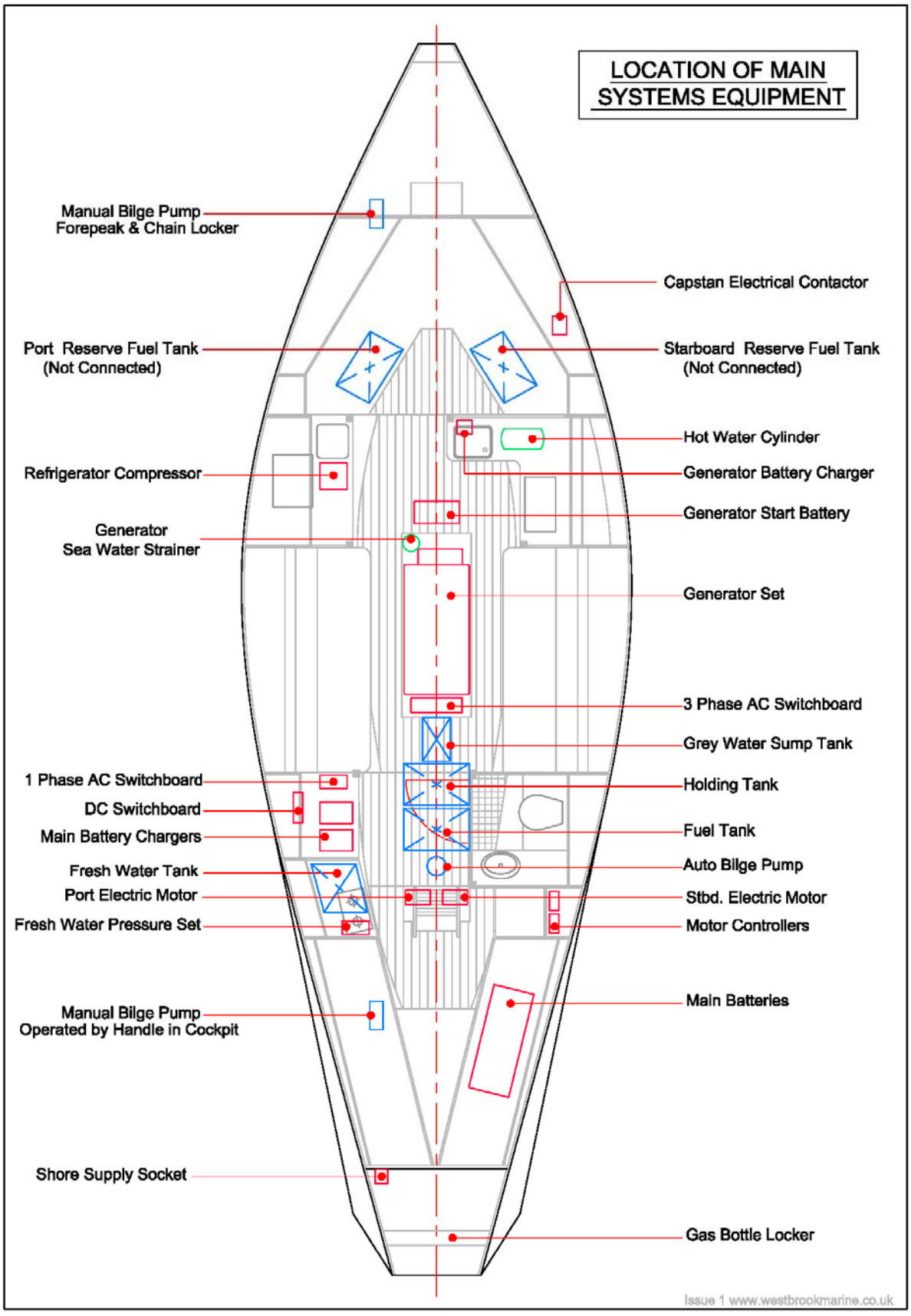
BOLEH is fitted with a fixed marine VHF radio with DSC capability and a hand-held VHF radio, both sited in the locker outboard of the chart table.

The fixed VHF is a Raymarine Ray55E. For full operating instructions please refer to the manual supplied by the manufacturer.

The main VHF antenna is fitted at the top of the masts. In the event of a loss of connection to the main antenna, an emergency antenna is provided. The cable for the emergency antenna should be passed through a ventilation hole above the chart table instrument display and connected to the radio in place of the main antenna. Take the emergency antenna on deck and fix as high as possible.

A notice is posted next to the chart table adjacent to the VHF set detailing operation in case of emergency.

3.5.9 Location of Main Systems Equipment



3.6 Safety Equipment

BOLEH is provided with a full complement of safety equipment (See following diagram for locations)

FIRE

BOLEH is supplied with four manually operated portable extinguishers.

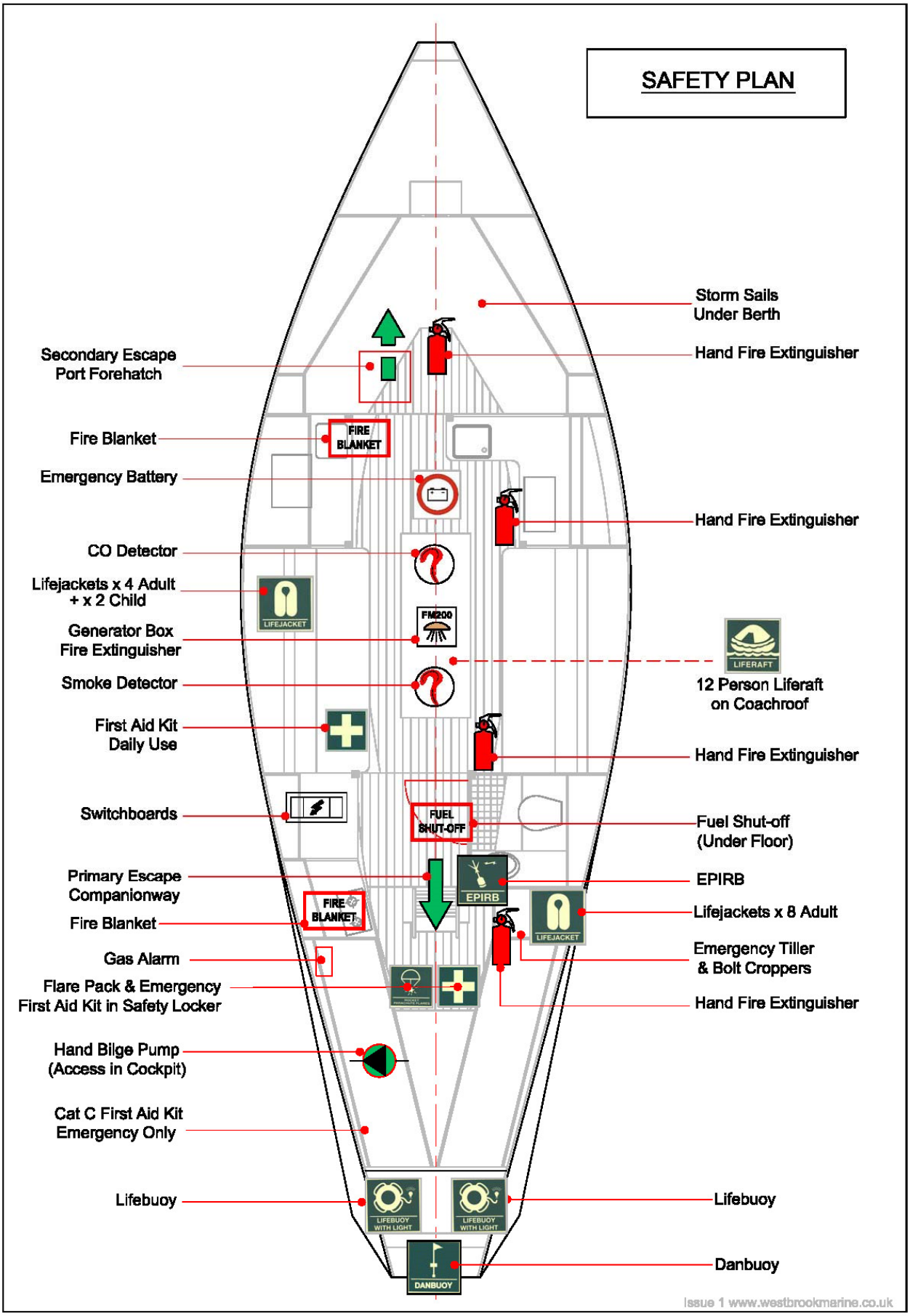
An independent automatic fire extinguisher is fitted inside the generator set sound shield. This extinguisher can also be operated manually if required. The manual operation is by a pull lever sited at the aft end of the generator in the 3 phase switchboard compartment. A fire alarm indicator light is fitted in the cockpit next to the motor controls. See the manufacturer's manual for detailed instructions.

Two fire blankets are provided, one in the galley and one aft.

BOLEH has self-powered smoke and carbon monoxide detectors mounted in the saloon overhead. These should be tested weekly and repaired or replaced immediately if found to be faulty.

FLOOD

BOLEH is fitted with two manual and one 12 volt DC electric bilge pumps.
All bilge water in the main part of the hull drains to a single point below the floor at the base of the companionway ladder.
From here water is pumped automatically overboard by the electrical bilge pump. This pump operates via a solid-state water level switch. A second level switch is fitted at a higher level and will trigger an alarm at the chart table should the electrical pump fail.
The electrical bilge pump is controlled through a 3-position switch on a panel at the chart table. The 3 positions are auto, off and manual. Normally the switch should remain in the auto position but the pump can be run continuously by selecting manual. When clearing the bilge using this method, the switch should not be left in the manual position longer than necessary otherwise the pump will overheat and the batteries will be run down.
Bilge water can also be pumped out using the manual bilge pump operated from the cockpit. The handle for this pump is stowed in the navigation display locker.
A second manual bilge pump is fitted in the focsle to empty the forepeak or chain locker via a change-over valve located in the forepeak on the port side.
The generator has a drip tray fitted under to prevent oil and fuel entering the bilges. This tray can be emptied using a sponge or bailer and the waste disposed of properly. An oil absorbing pad is fitted in the drip tray.


SAFETY PLAN
Storm Sails
Under Berth
Secondary Escape
Port Forehatch
Hand Fire Extinguisher
Fire Blanket
FIRE BLANKET
Emergency Battery
Hand Fire Extinguisher
CO Detector
Lifejackets x 4 Adult
+ x 2 Child
LIFEJACKET
Generator Box
Fire Extinguisher
FM200
LIFERAFT
12 Person Liferaft
on Coachroof
Smoke Detector
First Aid Kit
Daily Use
Hand Fire Extinguisher
Switchboards
FUEL SHUT-OFF
Fuel Shut-off
(Under Floor)
Primary Escape
Companionway
EPIRB
Fire Blanket
FIRE BLANKET
Lifejackets x 8 Adult
Gas Alarm
Emergency Tiller
& Bolt Croppers
Flare Pack & Emergency
First Aid Kit in Safety Locker
Hand Fire Extinguisher
Hand Bilge Pump
(Access in Cockpit)
Cat C First Aid Kit
Emergency Only
Lifebuoy
LIFEBUOY WITH LIGHT
Lifebuoy
Danbuoy
DANBUOY
Issue 1 www.westbrookmarine.co.uk

3.7 Anchor, towing and mooring facilities

BOLEH is provided with a substantial *Bruce* type main anchor and length of mooring chain. Always carry out good seamanship when anchoring by checking the sea bottom has sufficient holding and ample scope of chain is let out.
The anchor and chain is retrieved using a 12V DC electrically powered capstan (with manual back-up using a sheet winch handle). The windlass is normally controlled by a handheld portable wireless transmitter. A second fixed control is located in the cockpit in the motor control locker. The anchor is stowed in a tilting stemhead fitting making the anchor easily deployable. For heavy weather the stemhead bulwark gap is provided with a drop-in washboard to reduce waves coming aboard. **The washboard must be removed before deploying or recovering the anchor and cable.** A wire securing strop is also provided to secure the anchor whilst at sea. The anchor cable is marked with yellow cable ties denoting the amount of cable let out. The number of cable ties indicate the length of cable in steps of 10 metres.

BOLEH has a kedge anchor stowed aft of the cockpit. The kedge anchor warp, which can also be used as a towing warp, is stowed in the forepeak.

BOLEH can be towed by securing a towline to the heavy cleat sited on the foredeck centreline aft of the capstan. To facilitate easy operation, the tow rope can be attached to a bridle which leads through port and starboard mooring bow ports. The bridle can then be secured to the centre or side metal cleats.

When securing to a swinging mooring, a bridle set-up similar to the towing method allows the anchor to remain in the bow roller.

Mooring cleats are provided on BOLEH forward, amidships and aft. Always use the mooring lines provided on board and double up all lines when leaving BOLEH moored and un-attended. Always check regularly for wear of the mooring lines at the fairleads and mooring ports. **Do not use worn, frayed or dirty mooring lines.**

On approach and when mooring alongside always use all the fenders provided to prevent damage. Ensure that fender lanyards are properly fitted with the plastic protectors provided to prevent damage to teak rails and paintwork. At sea, fenders are normally stowed by hitching their lanyards to the coachroof handrails port and starboard.

3.8 Dinghy and Outboard Motor

BOLEH is provided with an inflatable dinghy and an electric outboard motor. For operating instructions see separate manual. The dinghy is normally carried deflated and bagged and stowed in the aft cabin. The outboard motor is stowed under the focsle berth.

3.9 Covers and Awning

BOLEH is provided with a set of canvas covers for the mainsail, forehatches, skylights and yard winch. When leaving BOLEH for more than 24 hours these covers must be put in place. A cockpit awning is also provided and can be rigged over the boom as required.

3.10 Ventilation

BOLEH is fitted with a number of natural vents to promote good air circulation during normal operation.
An electrically powered extract fan is fitted in the WC.

The generator set is fitted with a fan ventilated enclosure. The fan draws air from aft through the bilge and exits forward into the forepeak via a duct. The forepeak is ventilated by a pair of mushroom vents. The generator ventilation air becomes warm but does not carry any products of combustion. If any smells or odours of fuel or exhaust gas are noticed the generator set is to be stopped and all hatches opened. The generator must not be used until serviced by a suitably qualified person to correct any faults, leaks etc. **When running the generator always ensure the large mushroom vent over the galley and the forepeak vents are fully open.**

At the foot of the companionway ladder is the drive motor box which has a number of ventilation openings. **Do not obstruct these openings.**
Before operating the drive motors ensure the ventilation fans are working by feeling for air flow from the aft vent openings. See also Motor Temperature paragraph on Page 15.

A carbon monoxide (CO) detector is fitted in the saloon. Crew must not sleep in any cabin when the generator is running without providing ample through ventilation by opening skylights, hatches, washboards etc.

When laying up for the winter open all lockers and drawers to promote good air circulation around the wooden internal frames and planking.

3.11 LPG System

BOLEH is fitted with an LPG gas cooking system. The installation comprises of a gas bottle stowage locker fitted to the inside of the upper transom, two 3.9kg gas bottles, change-over valve, pressure regulator, pipework, valves and a two-burner fixed hob. The hob has been sited at the foot of the companionway on what was the workbench top. Fire insulation on the adjacent wood structure and a fresh air vent are fitted above the hob.

The gas system is regulated to operate at 30mbar pressure.
Mushroom vents are provided for fresh air ventilation and must be open when the hob is in use. One vent is sited on the deck locker lid above the hob unit; a second mushroom vent is fitted forward of the deckhouse on the centreline. It is recommended that the top washboard be left unfitted to provide additional ventilation.
The transom gas bottle locker is to be used only for the LPG system; no other items are to be stowed in this locker.
Regular inspections of hoses, pipes, valves etc. of the LPG system are to be made, at least annually, and replacement/repair made by a suitably competent person if any deterioration is found.
Valves on empty cylinders are to be kept closed and disconnected. Protective covers, caps or plugs to be kept in place. The reserve or empty cylinder is to

be kept in the LPG locker which is vented to the outside and intended for that purpose. Any additional spare bottles required must be stowed only on deck, securely attached and protected from weather and mechanical damage and where any escaping gas can flow freely overboard.

LPG supply line valves and cylinder valves are to be closed when the hob is not in use, before refuelling and immediately in an emergency.
The hob isolation valve is to be closed before opening the cylinder valve.
The hob is not gimballed and therefore not to be used when angles of rolling or sustained angles of heel are likely.

The LPG system is to be checked for leakage before each use by means of the bubble leak detector fitted. For details, see the manufacturer's instructions in the separate manual provided.

The above user test does not replace the regular LPG system check by a competent person as noted above.

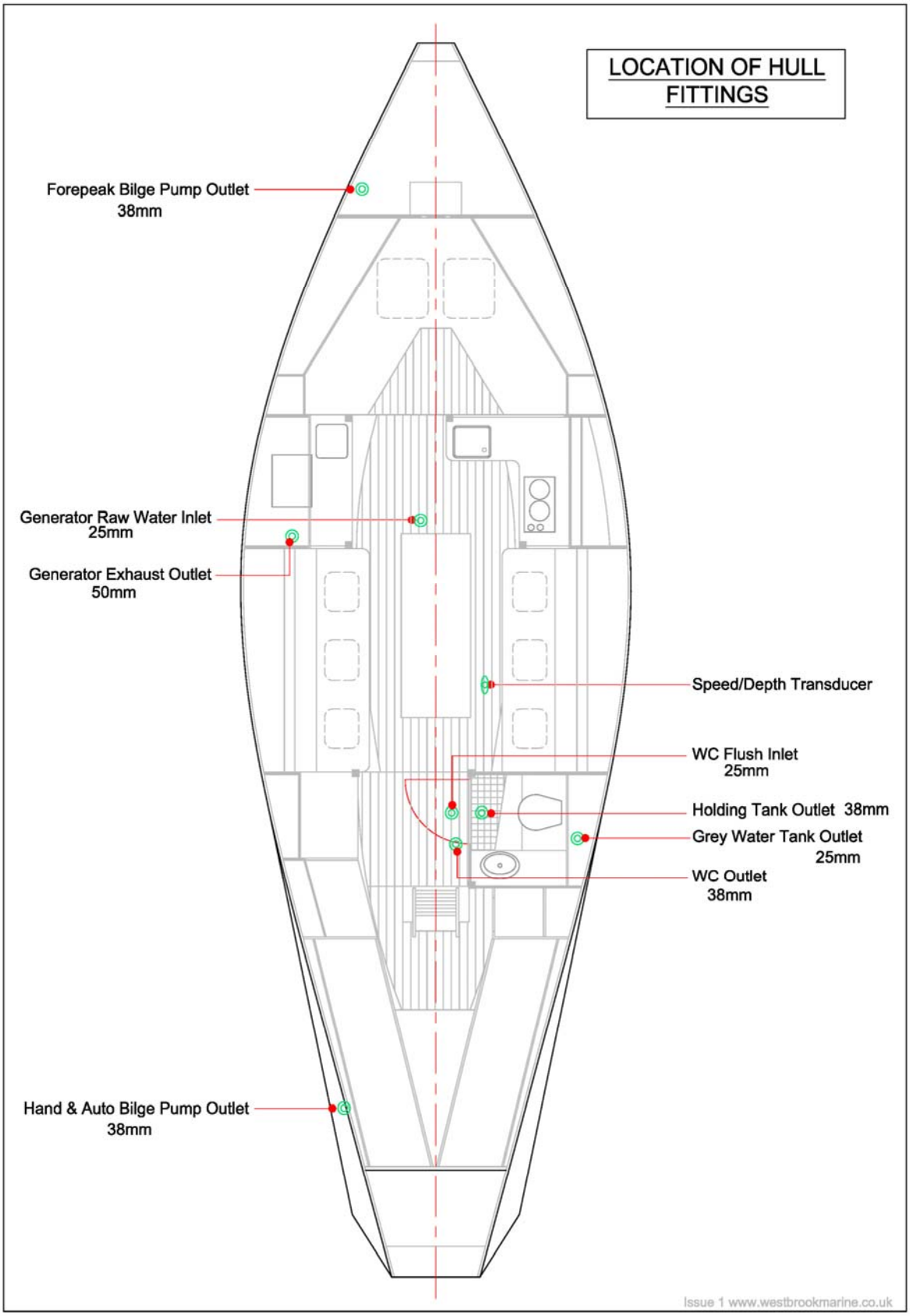
If LPG leakage is detected either by bubble test or by alarm the following actions are to be taken immediately:

a) Shut off the LPG supply at the main supply valve.
b) Extinguish naked flames and other ignition sources.
c) Do not operate any electrical switches, circuit breakers etc.
d) Evacuate crew to deck or ashore as appropriate.
e) Open hatches and skylights to ventilate the accommodation.

WARNING — Do not use an installation that has leaked until it has been inspected and repaired by a competent person.
WARNING — Never leave BOLEH unattended when open flame LPG consuming appliances are in use.
WARNING — Do not smoke or use an open flame when replacing LPG cylinders. Close cylinder valves on empty cylinders before disconnecting for replacement.
WARNING — Never use a flame to check for leaks.
WARNING — Fuel burning open flame appliances consume cabin oxygen and release products of combustion into the yacht. DO NOT USE THE HOB FOR SPACE HEATING. Ventilation is required when the hob is in use. Ensure that at least both the mushroom vent above the hob and also the large mushroom vent at the forward end of the deckhouse are fully open when the hob is in use. Never obstruct ventilation openings. The ventilation requirements have been calculated to suit the LPG appliance as installed. Additional ventilation might be required if other appliances are operated simultaneously.
WARNING — Do not modify the craft's LPG system. Installation, alterations and maintenance must be performed by a competent person. The present system has been inspected by an authorised person and a safe use certificate issued.
WARNING — If a leak is detected shut off the main LPG supply valve in the transom box.
CAUTION — Do not use solutions containing ammonia for manual leak testing.

BOLEH is fitted with an LPG gas monitor and alarm comprising two parts; a monitor unit and a splash-proof sensor.
The monitor is sited just aft of the hob unit and has a two-tone alarm, LED status light and an alarm cancel button. The sensor is mounted in the bilge under the cabin sole at the foot of the companionway.
No day to day action is required. In the event of an LPG gas leak the alarm will sound and action must be taken as described above.
For further information on the gas monitor and alarm see the maker's user manual provided.

3.12 Hull Fittings



4 Environmental Protection

4.1 Fuel and oil

Extra care is to be taken when filling the diesel fuel tanks. Lay a wet cloth around the fuel inlet or use other methods to prevent fuel from spilling over the side. Reduce the filling speed when the tank is near full to prevent sudden spillages.

Dispose of waste engine oils, oily bilge water or similar fluids by taking them ashore in sealed containers to proper waste disposal facilities.

The generator set is fitted with a watertight tray to prevent oil spills into the bilge. During routine generator maintenance ensure the tray is kept clean and dry by removing any oily water waste and disposing as noted above. An oil absorbing mat is provided and should be changed when saturated.

4.2 Waste

No waste of any kind is to be thrown over the side, this includes items considered as biodegradable. Waste bags are provided on board and should be taken ashore at the end of each voyage and disposed of at the appropriate facilities. A separate waste bag for re-usable/recyclable items is recommended.
In normal operation, the WC on BOLEH discharges directly overboard. However, there is a limited capacity holding tank fitted to retain black water when the WC is used in sensitive areas such as enclosed marinas and non-tidal waters. The tank is selected by operating the Y-valves as shown on the diagram on Page 18. The hoses next to the Y-valves are marked to show the direction of flow. The Y-valve handle position 'points' to the hose selected. A tank full alarm and light is fitted in the heads space. The tank can be pumped out using the hand pump housed in the locker in the heads.

4.3 Sound

The generator set on BOLEH is fitted within a sound enclosure and the exhaust is well silenced. However, prolonged running in crowded moorings particularly at un-sociable hours is to be avoided.
To prevent unnecessary disturbance, it is possible to operate BOLEH under electric motors at part throttle for a maximum 45 minutes and up to 3 knots without the generator set switched on. This is particularly useful when arriving or leaving a mooring at night.

4.4 Wash

The speed of the yacht should be kept low to minimize wash when operating near riverbanks or among small vessels to avoid unnecessary damage and disturbance.

4.5 Exhaust gas

BOLEH's generator set runs at a constant speed providing good efficiency but if the exhaust gas shows black or white smoke then the unit must be stopped and checked by a suitably qualified engineer.

4.6 Antifouling coatings

The underwater part of BOLEH's hull is protected with an antifouling coating to prevent marine growth and maintain sailing efficiency. When lifted out of the water or drying out alongside, the antifoul coating should be checked for any damage and bare areas treated as necessary. Always use products that are compatible with the existing paint scheme and follow the maker's directions. When scraping or cleaning back old antifoul and re-painting suitable ground sheeting should be used to collect residues, dust etc which can then be disposed of suitably.

ANNEX A
CONTACTS LIST

For all enquiries, questions or reporting relating to Boleh please contact in the first instance:

Henry Middleton
The Boleh Trust
The Old Shop,
Enford,
Pewsey,
Wiltshire SN9 6AR
Tel: 07792 527940
E-mail: hkwmiddleton@btinternet.com

Alternatively:

Mark Minshull
Boleh Trust Technical Manager
Tel: 07714 064119
E-mail: markminshull@ntlworld.com

PART 2

MAINTENANCE

PART 2 CONTENTS

1 Routine Generator Maintenance

Always ensure both retaining clips are fitted to the raised table top before starting the daily checks.

Before each voyage and each following day, the crew must check the following:

Check oil level
Check coolant level
Check condition of hoses & hose clips
Check belt tension
Check general condition – water or oil leaks, loose items etc.

Enter date and time of check in Generator Log Book and initial.

Every 250 Hours of Generator Running (or every year whichever is soonest)
(This must only be carried out by a suitably qualified marine engineer.)

Change lubricating oil
Change lubricating oil filter
Check all fastenings are tight
Check belt tensions
Check coolant sacrificial anode, replace if necessary
Check external nuts, bolts and fastenings are tight
Remove heat exchanger stack, clean and replace rubber O-rings
Check sea water pump impeller, change if required
Check air cleaner element and change if necessary

Enter date and time of 250 hr service in the Generator Log Book and initial.

Every 750 Hours of Generator Running (or every 3 years whichever is soonest)
(This must only be carried out by a suitably qualified marine engineer.)

Carry out 250 hour service plus
Change fuel filter
Change coolant anti-freeze mix

Enter date and time of 750 hr service in the Generator Log Book and initial.

2 Monthly Check List – Whole Yacht

	Checked OK	Comments	Date & Initials
Check Electric Motor Drive Belts			
Check Primary Fuel Filter			
Check Rig for security and wear			
Check Safety Equipment			
Grease Rudder Stock Seal			
Check Limber Holes Clear			
Check Peak Halyard for Wear at Block			
Grease Piston Hanks on Foresails			
Check Electric Motor Drive Belts			
Check Primary Fuel Filter			
Check Rig for security and wear			
Check Safety Equipment			
Grease Rudder Stock Seal			
Check Limber Holes Clear			
Check Peak Halyard for Wear at Block			
Grease Piston Hanks on Foresails			
Check Electric Motor Drive Belts			
Check Primary Fuel Filter			
Check Rig for security and wear			
Check Safety Equipment			
Grease Rudder Stock Seal			
Check Limber Holes Clear			
Check Peak Halyard for Wear at Block			
Grease Piston Hanks on Foresails			

Print copies of the Check List pages to continue recording checks.

3 Cleaning

Cleaning
Clean the underwater parts of BOLEH immediately after lifting out of the water. High pressure cleaning devices should **not** be used for this. High pressure washing can displace caulking from seams and lift paint coatings that are otherwise sound. A firm nylon brush and a fresh water hose should only be necessary. For any areas of heavy fouling the careful use of a wide blade flat scraper is advised.

Care of the Deck
Untreated teak decks and rails weather to a natural silver-grey colour with no detriment to the timber's strength. Teak has very good durability and weather-resistant properties therefore the use of protective paints or coatings is not required.

Practical tips on care and maintenance:

Teak cleaners should be used only if they contain no other active ingredients apart from normal soap. The use of cleaners containing phosphoric or oxalic acid, commonly used as brighteners, are corrosive substances which attack both the caulking material and the timber causing them to age more rapidly.

It is strongly recommended that wooden decks be washed down with a soft nylon brush and clean water with a small quantity of normal soap may be added. The use of a high pressure washers are **not** to be used. The high pressure water jet will remove areas of sapwood and break the seal between the caulking material and the sides of the joint.

In extended periods of hot, dry weather wooden decks should be washed with salt or fresh water. Excessive loss of moisture causes the timber to shrink placing joints under stress.

4 Coatings
Always consult the paint manufacturer on the best coatings to protect BOLEH's structure and maintain a high-quality finish. Ensure that all preparation and application follow the maker's instructions. The use of a paint system from a single reputable paint manufacturer is advised. The blue bulwarks are finished in International Toplac Sapphire Blue.

5 Spare Parts
The equipment used on BOLEH comes mainly from well-known marine suppliers and organisations and therefore there should be little problem in obtaining spare parts for proper maintenance and repair. In case of difficulty please contact the BOLEH Trust – See Page 37.
Should parts for maintenance or repair become unavailable, replacement equipment to the same or better standard is to be used. The substitution of inferior equipment and spares is to be avoided to ensure levels of safety and compliance are maintained.

6 Repair Work
Repairs should be carried out by suitably qualified persons under the best conditions using first rate materials. If in any doubt, please contact the BOLEH Trust – See Page 37.
Should any significant modifications be required, the permission of the BOLEH Trust **must** be obtained before starting work.

7 Winter Storage

Before winter storage carry out the following:

- Clean, grease and tighten all battery terminals.
- Charge batteries (if possible remove and store in a dry, frost free space).
- Drain all fresh water pipe lines, water tank and filters.
- Cycle all valves including hull valves to ensure smooth operation.
- Flush toilet, waste pipes and holding tank with clean water.
- Lower and dismount the yard.
- Lash the tiller.
- Empty bilges and clean.
- Make good and touch-up any worn or damaged paintwork or varnish.
- Open lockers and stowages to allow maximum air circulation including forepeak hatch.
- Remove any loose equipment (e.g. soft furnishings) liable to damage from frost or damp.
- Remove foodstuffs etc that may deteriorate over the winter period.
- Follow engine maker's instructions for winter lay-up.
- Carry out annual generator diesel engine and electrical service.
- Drain engine cooling water circuit.
- Replace hull and shaft anodes if more than 50% depleted.
- Prepare 'to-do' list and remove equipment needing replacement or repair.
- Check all standing and running rigging for wear and replace as necessary
- Check all blocks and sheaves for free running and for wear.
- Inspect all rig fittings and fastenings for damage and security.
- Wash or launder sails and running rigging, dry and store ashore.

At a maximum of every 5 years, at winter storage, carry out in addition the following:

- Un-step the mast using a suitable crane.
- Replace all running rigging. Replace standing rigging every ten years.
- Lift BOLEH out of the water, clean underwater and check condition of all parts. Re-coat antifouling and re-launch. Do not leave BOLEH out of the water for any extended period as this will cause undue drying out of the timber structure which may cause serious leaks.

8 List of separate equipment manuals provided

Reference

1	Specification, installation, operation and maintenance data for Beta Marine generating sets.
2	Beta Marine operator's maintenance manual – Small diesel engine range
3	Meccalte self-regulating alternators operating and maintenance instructions
4	LMC marine drive systems Marlin 13 boat drive assembly manual
5	Lewmar V1-6 windlass owner's installation, operation and basic servicing manual
6	Gebuwin worm gear winch operating instructions
7	Parker Racor turbine series 500MA fuel filter/water separator instructions
8	Jabsco Twist 'n' Lock manual toilets installation, operation and servicing instructions
9	Jabsco Y-valve installation and servicing
10	Vetus exhaust system waterlock installation and maintenance instructions
11	Vetus grey water tank installation instructions and owner's manual
12	Vetus cooling water strainer installation instructions
13	Sigmar Marine compact water heater installation and maintenance instructions
14	SPX Aqua Jet Uno water pressure system instruction manual
15	Odyssey battery owner's manual
16	Ctek battery charger MXS 5.0 user manual
17	Whale Gulper 320 grey water pump installation guidelines and maintenance
18	Whale sanitation hand pump installation and maintenance
19	Zivan battery charger installation and user manual
20	Wema gauges installation instructions
21	Bilge pump alarm switch installation
22	Waterwitch float switch replacement installation, specifications and warranty
23	Waterwitch high water float switch replacement installation, specifications and warranty
24	ZF 400 series motor control head service sheet
25	Raymarine i60 wind instrument mounting and getting started manual
26	Raymarine AIS350 transceiver installation instructions
27	Raymarine AIS splitter 100 installation instructions
28	Raymarine Ray55e marine VHF radio owner's handbook
29	Raymarine AIS350 support software and documentation (on CD only)
30	Raymarine full documentation (on CD only)
31	Samlex Battery Moniitor Owner's Manual
32	Frigoboat Operating and Maintenance Instructions
33	Frigoboat Installation Manual
34	Raymarine e-series Mounting and Getting Started Instructions
35	Hella Marine Navigation Lights Positioning and Assembly Directions
36	Sea-Fire Installation Instructions and Owner's Manual
37	Kannad Marine Sportpro Automatic EPIRB User Manual
38	Carbon Monoxide Alarm User Manual
39	Clesse 3814 Emergency Automatic LPG Shut-off Valve Installation & Operation Sheet
40	NASA LPG Monitor & Alarm User Instructions
41	Alde 4071 LPG Bubble Leak Tester Installation Instructions
42	Propane Regulator 700E Instructions for Use
43	Bainbridge 4500 LPG Hob Unit – How to Use
44	Panasonic Microwave Oven Operating Instructions & Cookery Book
45	Kiwiprop Maintenance Instructions
46	Lewmar Sheet Winch Service Manual
47	Curtis 72 Volt DC Battery Charger
48	Watchdog TM4 Electric Motor Temperature Monitor and Alarm
49	Icom IC-M23 VHF Transceiver – Handheld
50	Galvanic Isolator
51	Electric Outboard