

Title:

**Training and Reference
Manual**

CWM 11

15/05/24	Sam Butts	Removed Safety Related Info, Updated Reefing, Sail Plan			
Date	Reviewed By	Changes			

Challenge Wales is a company limited by guarantee Reg No 05342397.

Table of Contents

1	Introduction	6
2	Yacht Specification	9
2.1	Challenge Wales	9
3	Batteries and Battery Charging	10
3.1	General.....	10
3.2	Service Batteries	10
3.3	Main Engine Batteries	10
3.4	Generator Start Batteries	10
3.5	Battery Charging.....	11
4	Main Engine	11
4.1	General.....	11
4.2	Fuel System and Records	12
4.3	Engine Checks	12
4.3.1	Water (Coolant).....	13
4.3.2	Oil.....	13
4.3.3	Belts.....	13
4.3.4	Bilge	13
4.3.5	Look	14
4.3.6	Gearbox	14
4.3.7	First Stage Fuel Filters	14
5	Generator.....	14
6	Consumables	15
6.1	Fuel.....	15
6.1.1	General	15
6.1.2	Loading Fuel (Bunkering).....	15
6.2	Water	16
6.2.1	General	16
6.2.2	Loading Water.....	17
7	Waste Disposal.....	17
7.1	Sewage.....	17
7.1.1	General Description.....	17
7.1.2	Discharge to Sea.....	18
7.1.3	Discharge to Shore Side Facility.....	19
7.2	Garbage.....	19
7.3	Oil or chemicals.....	20
8	Propane Gas.....	20
8.1	General.....	20
8.2	Connecting Gas Bottles	21
9	Yacht Subdivision and Bilges	22
9.1	General Description	22
9.2	Bilge System.....	22
9.3	Salvage/Fire Pump.....	23
10	Sails and Rig.....	24
10.1	Sail Specification	24
10.2	Standing Rigging	25

10.3	Sail Combinations.....	27
11	The Spars.....	27
11.1	The Mast.....	27
11.2	The Boom.....	27
11.3	The Windex.....	27
11.4	B and G Vertical Wand.....	27
11.5	Mast Head VHF Aerial.....	28
11.6	Mast Head Lights.....	28
	Deck Equipment.....	29
11.1	Snake Pit.....	29
11.2	Winches.....	31
11.3	Jammers.....	32
11.4	Dolly Winches or Snubbers.....	34
11.5	Turning Blocks.....	34
11.6	Main Sheet Traveller.....	35
11.7	Deck Cars.....	35
12	Headsails.....	37
12.1	Retaining Lanyard.....	37
12.2	Yankee.....	37
12.3	Stay Sail.....	38
12.4	Hoisting Headsails.....	39
12.4.1	General.....	39
12.4.2	Yankee Hoist.....	40
12.4.3	Staysail Hoist.....	41
12.5	Lowering Headsails.....	41
12.5.1	General.....	41
12.5.2	Staysail Drop.....	41
12.6	Changing Headsails.....	41
12.6.1	General.....	41
12.6.2	Option 1 (Conventional).....	41
12.7	Flaking Headsails.....	42
13	Running Backstays.....	43
	Mainsail.....	44
13.1	Hoisting.....	44
13.2	Sweating a Halyard.....	44
13.3	Mainsail Reefing.....	45
13.3.1	Reefing Down.....	45
13.3.2	“Shaking Out” a Reef.....	47
13.3.3	Reefing Quick Summary.....	48
13.3.4	Dropping the Mainsail.....	49
14	Spinnaker Pole.....	51
15	Communication.....	55
15.1	General.....	55
15.2	Hand Signals.....	55
15.3	Calls.....	56
16	Mast Climbing and Working at Height.....	58
17	Open Hatch Hazards.....	58
18	Mooring.....	59

19	Anchoring.....	60
19.1	General.....	60
19.1.1	Preparation	61
19.1.2	Lowering Operations.....	61
19.1.3	Use and Rigging of the Anchor Snubber	62
19.2	Anchor Watch	63
19.3	Weighing Anchor.....	64
19.3.1	Preparation	64
19.3.2	Operation.....	64
20	Tender Launching and Recovery	65
20.1	General Description	65
20.2	Launching	65
21	Navigation Station.....	66
21.1	General Description	66
21.2	PC 1.....	66
21.3	PC 2.....	67
22	Communication Systems including DSC.....	67
23	Mooring.....	70
24	Pilotage.....	70
24.1	The Barrage Locks	70
24.1.1	Introduction	70
24.1.2	Bay Levels.....	70
24.1.3	The Locks.....	71
24.2	Padstow	73
24.3	Portishead.....	73
24.4	Swansea.....	73
24.5	73
24.6	73

1 Introduction

Challenge Wales is a Sail Training Charity, this means we are not necessarily teaching people how to sail (although we can do this) but are helping those who step aboard to develop their personal and social skills, giving people a purpose, helping to broaden their horizons, a goal to strive towards, the opportunity to experience the highs of achievement and success and sometimes the lows of failure. Teamwork, leadership, discipline, respect for others and communication skills are all developed while onboard Challenge and Adventure Wales.

It is with this in mind that you should remember that, however frustrating it may be, the young people are on board to participate, these skills are not developed by undertaking a task yourself whilst everyone else looks on, engagement and participation is of primary importance however frustrating it may be, whether it is sailing the boat, cleaning the heads, or cooking food it is all part of the experience.

The Charity also helps our volunteers develop new skills too, including confidence, customer service, marketing & presentation skills and informal youth work.

The content of this training manual is to assist volunteer crew understand the various tasks and procedures that are carried out on board the Charity's yachts and to improve their familiarity with the yachts functionality. It is not intended to be a manual to teach the skills of sailing, the Royal Yachting Association (RYA) has an extensive library of books on this subject which are available through the Charity's office.

In an effort to improve our standards of training for volunteers, a more formal structured training program has been introduced. The program requires volunteers to reach certain levels of competence for them to achieve, not only for their position on the boat, but also for them to qualify for certain types of sailing trips where additional skills may be required such as racing events or voyages with young people who may have particular needs.

It is usual that Challenge Wales sails with six Challenge Wales personnel on board, four of these places are taken by experienced volunteers and the remaining two places are for trainee volunteers, it is as one of these two trainee positions that a volunteer will fill whilst undertaking the training program.

The training is structured around the RYA scheme and will result in the individual being awarded a Competent Crew certificate and then the Watch Leader certificate as the various requirements are met. Details of the requirements for Competent Crew and Watch Leader are available in the RYA publication Sail Cruising & Yachtmaster Scheme Syllabus and Logbook (G15/14) which is available free to members of the Charity or at a cost to non-members.

The main difference between obtaining Competent Crew as part of our volunteer training program as opposed to undertaking it with a sailing school is that it will require sailing on Challenge Wales as a trainee for 5 separate day sails, these may be Challenge Experience Days or Volunteer Training Days, and then crew on 5 days of residential trips as specified by the RYA for the Competent crew certificate.

Those wishing to progress to the Watch Leaders certificate will require 5 further days on board Challenge Wales, preferably a young person's residential trip and will have to have logged 100 miles, and at least 4 hours night sailing.

Individuals who join the Charity already holding the above certificates or higher will still be required to sail on a 5 day sail as a trainee before becoming a full volunteer so that they can learn Challenge Wales specific skills and familiarisation.

While sailing school training may be excellent, progression from a smaller yacht to the much larger and more complex Challenge Wales means learning different skills or enhancing skills previously learned.

Although some instruction will be given to ensure individuals meet the requirements laid down by the RYA, volunteers are expected to be self-motivated enough to study in their own time and then satisfy our instructor that they have the skills required. Any questions that may arise during the study period can be asked of any of the experienced personnel on board during the sailing days and may become a specific topic on one of the Volunteer Training Days if appropriate.

This 10 day program is designed to meet the minimum requirements for the RYA Competent Crew certificate and also give additional crewing time as a trainee to become more familiar with the yacht and develop your own confidence when sailing the boat, especially when there are young people and those of little or no sailing experience on board.

You need to be confident enough in your own ability to demonstrate to young people the various skills involved in sailing with Challenge Wales and to monitor them when they are undertaking the tasks themselves.

Please note that there is no charge for undertaking the Competent Crew certificate in this way. Apart from the standard crew fees no other charge currently applies and there is no requirement for you to complete it but after completing 10 days of sailing it is expected that you should have acquired the skills for the qualification and will be assessed accordingly.

A copy of the Competency Crew Log and Watch Leader Log can be found in the Appendix to this manual.

NOTE;

It is the responsibility of all crew to make themselves aware of additional information held in the Operations Manual, Safety Training Manual, Technical Manual, and Emergency Offshore Response Manual which are kept on board at all times.

Publications

Please note that all RYA publications are available through the Charity and will be available through our online shop shortly.

Induction Training

The Induction Training that you would have undertaken to become a volunteer was put together to give you an overview of what the purpose of the Charity is, the management structure, procedures and policies, targets and goals are. These are set out in our Safety Management System (SMS) and Operations Notice No 5 refers to these.

Volunteers who joined the Charity after the Induction Training scheme was introduced are welcome to attend one of these inductions which are being scheduled periodically, subject to demand, dates of which can be obtained by the office. The induction lasts approximately 1½ hours and is held both at the Challenge Wales office and also on zoom, both daytime and evening, to facilitate most people's availability. Please contact the office to sign up to one of them.

Additional training covering the youth work side of the Charity's operations, when these are scheduled will be promulgated through the usual channels.

2 Yacht Specification

2.1 Challenge Wales

Length Overall	72ft	21.6m
Length at waterline	61ft	18.8m
Beam	18.2ft	5.5m
Height of mast above waterline	95ft	29m
Maximum Draft	10ft	3.30m
Maximum Displacement		55 tonnes
Ballast keel weight		9.8 tonnes
Sail area – windward	2825 sqft	262 sq m
Sail area – downwind	4020 sqft	373 sq m
Water tank capacity	390 gals	1775 litres
Fuel tank capacity	475 gals	2150 litres

Hull	50A mild steel
Keel	Steel fin and lead bulb
Deck & coamings	316 stainless steel
Coach roof	GRP balsa sandwich

Designed and fitted to comply with MCA Cat 0 and Royal Ocean Racing Club Cat 0 operations – worldwide in high latitudes

Accommodation for 18

3 Batteries and Battery Charging

3.1 General

There are 3 separate banks of batteries on Challenge Wales, these are:-

- 1) Service batteries
- 2) Main engine start batteries
- 3) Generator start battery

3.2 Service Batteries

These consist of 6 x 12 volt 206Ah GEL type batteries connected into 3 pairs giving 24 volt output. The batteries are located under the saloon settee.

These batteries require little maintenance but still come under the PMS for inspection and terminal cleaning.

There is a master on off switch located under the after end of the settee and which has 4 positions, OFF, BREAKER PANEL No 1, BREAKER PANEL No 2, and BOTH BREAKER PANELS. This switch would normally be in the BOTH position.

3.3 Main Engine Batteries

The Main engine batteries are located in the upper level of the machinery space and consists of 2 x 12 volt sealed batteries connected in series to give 24 volts. The batteries are charged from the alternator on the engine and also by a secondary output from battery charger No 1 which enables a trickle charge to be maintained whenever this charger is running.

Maintenance is purely that of cleaning and terminal inspection.

A master switch for the starter batteries is located underneath the bench seat of the navigation station. This switch is also has 4 positions OFF, Position No 1, BOTH, Position No 2, In position No 1 the engine start function is supplied from the engine start batteries, in position No 2 the start function is supplied from the service batteries. Position No1 is the normal setting for this switch, position No 2 should only be used in the event of a failure of the engine batteries.

UNDER NO CIRCUMSTANCES SHOULD THE POSITION "BOTH" BE USED.

3.4 Generator Start Batteries

Located with the Main engine Batteries this battery consist of a single 12 volt sealed battery charged solely from the Generators own dedicated alternator. As with the other batteries little maintenance is required but should be carried out in accordance with the PMS schedule.

3.5 Battery Charging

Charging of Service batteries and the Main Engine batteries is provided by either the alternator on the main engine or by 1 or both the battery chargers located underneath the chart table.

The Generator start battery can only be charged from the alternator on the generator itself.

There are interlocks that will prevent the batteries being overcharged by having the battery chargers running at the same time as the main engine alternator.

It should be noted that the main engine alternator receives its excitation current via a second oil pressure switch on the starboard side of the engine which in turn is supplied from a dedicated fuse behind the main panel at the chart table and not from the engine control panel as is usually the case. The result of this means that the alternator will not generate until there is oil pressure and failure of alternator could be a failure of the fuse.

4 Main Engine

4.1 General

The engine is a 6 cylinder Perkins Sabre naturally-aspirated diesel rated at 130 HP. It drives a three-bladed, left handed propeller through a 2:1 ratio reversing gearbox and is controlled by a single lever control located low on the port side of the helm position. It is **very important** to ensure that the throttle lever is in the Neutral position before starting the engine.

The engine is water-cooled through a heat exchanger; coolant circulating through the engine transfers heat to a separate sea-water circuit which also cools the first stage of the exhaust before the latter is discharged at the stern. There is the option for the cooling water circuit to heat the hot water calorifier tank.

It should be noted that the discharge of the raw water cooling is through a sea valve in the bottom of the hull and not, as on most yachts, through the engine exhaust. Confirmation that there is raw water circulation can only be checked by lifting the sole board at the bottom of the companionway steps and viewing the sight glass at the top of the raw water strainer looking for turbulence.

Maintenance manual and Parts manual are available on the PMS on PC1 with hard copies in the manual library in the Skippers cabin.

A propeller shaft brake is provided and is accessible through a hatch under the lower bunk next to the engine space port-side. Crew should not attempt to fit this brake without proper instruction from a competent crew-member.

4.2 Fuel System and Records

Challenge Wales has 4 storage tanks for diesel storage, these are located under the sole boards and are referred to as Tanks 6, 7, 8, and 9. in the yachts technical library and logbook. Additionally there is a daily service tank located in the wet locker, this tank is supplied from the 4 storage tanks by means of a diaphragm pump attached to the bulkhead immediately inside the wet locker door.

The level of fuel in the daily service tank must be monitored and should be “topped” up at least once a watch when motoring, to facilitate this it is the practice that the tank is filled at the end of each watch so the oncoming watch has sufficient fuel for their watch. It is good policy that the oncoming Watch Leader checks that this has in fact been carried out during the hand over process.

DO NOT FILL THIS TANK BEYOND THE MARKED LEVEL, if this tank is filled completely it is possible that it will overflow causing spillage.

Tank capacities are stated in the Log Book.

Due to the inability to sound the various fuel tanks it is essential that a record of transfer from double bottom tanks to the daily service tank is maintained.

Record of tank status must be recorded in the Log Book in the section provided.

4.3 Engine Checks

Engine checks should be carried out prior to departure from any harbour/marina or any anchorage.

The checks can be remember using the mnemonic **IWOBBLU**;

- (I) Isolate the engine by turning the key in the engine compartment. This will prevent anyone from inadvertently starting the engine whilst you are working on it.
- (W) Level of the coolant in both the main engine and the generator.
- (O) Oil level in the main engine and the generator.
- (B) Tension on the alternator belts of engine and generator
- (B) Check engine bilge water level.
- (L) Visual inspection of the engines looking for oil or fuel leaks, this is particularly undertaken around the fuel filters.
- (U) Un-isolate the engine to restore it to operational status.

In addition it is necessary to top up the daily service tank in the wet locker as described above.

On completion of the engine checks a comment should be made in the maintenance section of the log book confirming the checks are complete and noting the amount of fuel that has been transferred to the service tank.

If any coolant or lubrication oil is required to either of the engines this should also be noted in the log book for future reference.

Spare oil and coolant is stored under the cabin sole in the starboard 5 berth cabin, note that the coolant should be mixed with water at a ratio of 50/50.

4.3.1 Water (Coolant)

The engine has a closed coolant loop, this coolant is itself cooled through a heat exchange system using water pumped from the sea. The filler cap is located on top of the header tank at the front of the engine. It can be identified by the overflow pipe leading from it.

Remove the overflow pipe from the drain and unscrew the cap taking care to avoid dropping it into the bilge: getting it out is difficult. The coolant level in the header tank should be approximately 2 inches from the top of the tank. If the level is low then add coolant from the small container in the engine space using the funnel supplied.

Do not overfill as when the engine is running the heated coolant will expand and excess will run off to waste. If the container is empty refill it using neat coolant and water in the ratio 50:50 (see Consumables section below).

4.3.2 Oil

The dipstick is located on the starboard side of the engine and is identified by a yellow knob. Withdraw the dipstick, wipe it clean, reinsert it fully, withdraw again and check that the level is between the two marks. Top up if necessary.

4.3.3 Belts

Belts at the front of the engine drives the alternator and the tension needs to be checked, unfortunately getting at them is awkward. Lean into the engine compartment and run your hand down the gap between the header tank and the plastic box next to it. Continue down until you find the belt cover and below that are the belts. There should be 2 and they should have about 1-2 cm play when pushed down. If there is excessive play or a belt is missing, inform the Skipper.

It should be noted that these belts only drive the alternator and their failure does not have serious implications as battery generation can be undertaken by the generator if needs be. However, spare belts are carried and they should be replaced at the soonest opportunity.

4.3.4 Bilge

Check the engine bilge for water and signs of oil leakage. If there is excessive water in the bilge or if there is evidence of any oil in the bilge inform the Skipper. **Do not automatically pump**

the bilge as it is an offence under MARPOL to discharge oily water overboard at a concentration greater than 15 ppm.

4.3.5 Look

Check the general condition of the engine: are there signs of fuel or oil leakage? Check that injector pipes and other components are not loose. Any defects must be reported to the Skipper.

4.3.6 Gearbox

The gearbox oil should be checked in accordance with the PMS. The oil for the gearbox is the same as that of the main engine.

4.3.7 First Stage Fuel Filters

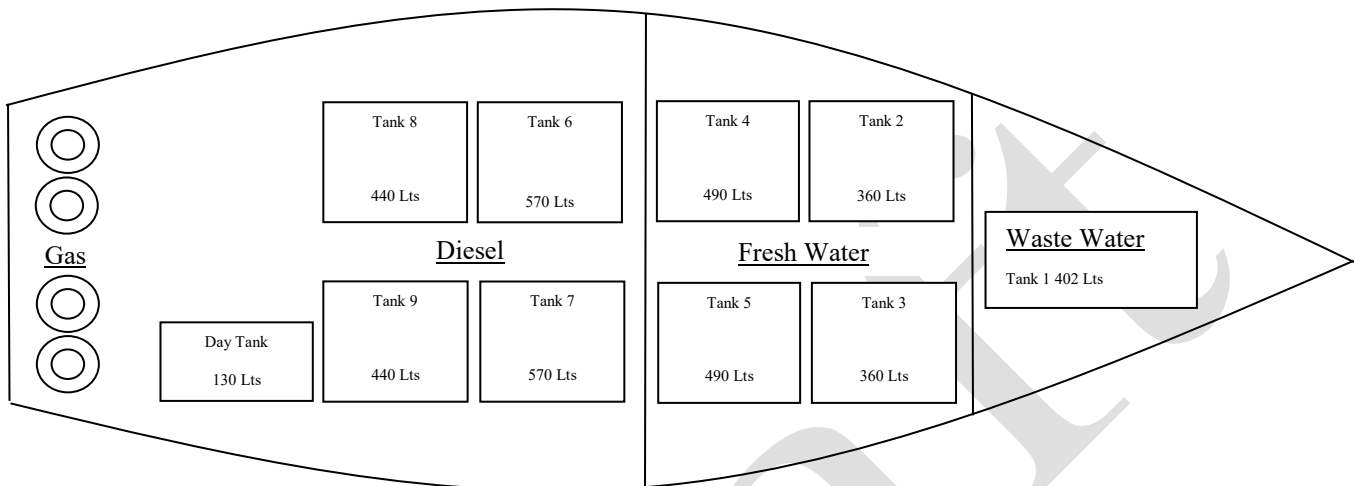
The First Stage Filter provide for both the main engine and the generator and is located in the wet locker at the bottom of the forward bulkhead. A duplex filter system is used enabling quick change over to a new filter in the event of filter blockage.

5 Generator

The generator is by Northern Lights delivering 5.5kW at 110 VAC. It provides current at 110 volts for the battery chargers and to recharge the boat's service batteries and the engine-starter batteries which are located in the generator space. The cooling system is similar to that of the engine and it too can supply hot water via changeover valves in the engine compartment.

6 Consumables

The diagram below shows the layout of the fuel and water tanks located below the floor in the saloon/galley area. The Waste Water or Holding tank is located under the floor between the heads. The Day Tank (also called the Service Tank) is located in the Wet Locker. Propane gas is stored under the gratings of the aft cockpit.



Schematic of the fuel, water, and gas storage

6.1 Fuel

6.1.1 General

As mentioned earlier Challenge Wales has 5 fuel tanks, 4 storage tanks in the form of double bottom tanks and a Day Tank located in the wet locker. The capacity of the tanks is 2 x 470 lts, 2 x 570 lts and the day tank of 125 lts. The engine and generator draw fuel from the Day Tank which must be re-filled to the mark before sailing and at the change of each watch.

Changeover valves are located under the cabin sole at the rear of the saloon area. As there are no tank gauges what remains in the tanks can only be judged by totalling usage as recorded in the log book. THESE VALVES MUST NOT BE TOUCHED WITHOUT FIRST CLEARING IT WITH THE SKIPPER.

All tank changes must be noted in the Maintenance section of the ship's log.

6.1.2 Loading Fuel (Bunkering)

Fuel is loaded through a filling point on the starboard side of the coach house into the day tank and from there to the selected storage tank. The layout of the various valves is contained in the Technical Drawing Manual on board.

There are two filling points alongside of each other on the coach house side, it is important that when loading fuel both of these are open as the second filling point is used as a vent from the

day tank preventing the tank pressurising and causing a 'blow back' and oil spill. It does not matter which one is used to fill and which is used to vent.

Bunkering fuel, without risk of spillage, is a 3 man operation, the procedure is as follows:-

- 1 Check and double check the available capacity for the fuel being delivered.
- 2 Open both the above mentioned filling points.
- 3 Open the valve on the side of the day tank using the valve handle laying loose on top of the tank, this will cause some of the fuel from the day tank being deposited into the storage tanks once their valves are open. The handle is removed when the valve is closed as an added precaution to prevent the valve being accidentally opened and the fuel from the day tank potentially disappearing back into the storage tanks.
- 4 Open the valve on the selected storage tank.
- 5 Have oil spillage material at hand in case required.
- 6 Establish communications between the crew member watching the tank levels in the wet locker, the crew member at the nozzle controlling the flow, and the shore side attendant at the pump.
- 7 Insert the nozzle into the filler point and secure it to prevent it falling out under pressure.
- 8 Commence bunkering when all are ready.

The rate at which fuel can be loaded is governed by the rate that the fuel flows, by gravity, from the day tank to the selected storage tank. It is important that the level in the day tank is kept at the bottom of the sight glass so that the level can be monitored and there is sufficient space in the tank to allow time, once the storage tank is full, to either stop bunkering or change the valves to that of a different tank.

Once the required quantity of fuel has been loaded the valves on all the storage tanks should be opened and left open for about 5 minutes. This will enable all tanks that have been completely filled to transfer a small amount of fuel to a partially full tank thus leaving a void space to absorb any expansion of the fuel without it overflowing on to the deck through the tank breather. After the tanks have levelled close ALL the tank valves, the valve on the side of the day tank, and remove its handle.

Close the deck filling points.

Details of how much fuel and where it was distributed must be entered into the log book.

A schematic of the fuel loading system is available in the technical folder in the vessels library.

6.2 Water

6.2.1 General

Two tanks of 360lts and two tanks 490lts capacity are positioned below the cabin sole at the forward end of the saloon. The filler cap for the system is located on the counter-top in the starboard head. Tanks are filled in turn, tanks are selected using inlet valves located under the soleboards to the front of the saloon area.

There are two electric pumps in the locker under the galley fridge which lifts water into the hydrophore tank for distribution to the various cold water taps and the hot water calorifier. Under normal operation only one of the pumps are used there being individual switching for them at the pump location.

When a storage tank is empty the water pump will run continuously requiring selection of another tank. Changeover valves are located under the cabin sole in the main saloon. Any change of tanks should be reported to the Skipper and recorded in the Maintenance section of the ship's log.

6.2.2 Loading Water

The filler point for the water is located in the starboard heads. A single pipe runs from here to each storage tank in turn with a ball valve to isolate them.

Before loading the area around the filling point should be cleaned using an anti-bacteria solution.

The valve to the required tank should be opened and the cap for the filling point removed. Before passing the filling hose through the hatch to the heads water should be flushed through it to remove any stale water or impurities that may have got into it.

When water is flowing into the tank it will be noted that air will be escaping from one of the four tank vents that are on the edge of the sink, once the tank is full then this will change to water. In addition to the water flowing from the vent pipe water will also back flow to the filling point in the heads spilling over the vanity unit surface. This water will run into the sink or shower tray which are connected to the holding tank. This means that the holding tank will fill and require pumping out by whatever means is appropriate. The water supply should therefore be shut off as soon as possible or the valves on the delivery line changed to fill another tank.

On completion of loading water ensure that ALL valves are closed.

A schematic of the water loading system is available in the technical folder in the vessels library.

7 Waste Disposal

7.1 Sewage

7.1.1 General Description

For the purposes of complying with aspects of MARPOL Annex IV (referred to as "Annex IV"), the Polar Code and the Merchant Shipping (Prevention of Pollution by Sewage from Ships) Regulations 2020 (SI 2020/620) (referred to as the "UK Regulations") Challenge Wales is fitted with a holding tank to retain discharge from the two heads including the showers trays and wash basins. It should be noted that the sinks in the galley discharge direct to the sea.

The tank is of 402 lts capacity and located on the centre line forward of the mast. To monitor the level in this tank it is fitted with a high level alarm located in the main saloon which activates when the tank is approximately 90% capacity.

There are three methods of discharge of this tank, two of these are to the sea and the third via the shore connection to shore side vacuum facilities.

7.1.2 Discharge to Sea

This is achieved either by use of the electric discharge pump or by the manual back-up facility, both these pumps are located under the sole board in the centre alleyway outside the heads.

Operation of either method requires precise settings of the valve system both at the tank and respective overboard discharge valves.

It is important that operators familiarise themselves with the valve system and ensure all valves on the discharge system are closed on completion of operations to prevent accidental discharge in restricted areas or inappropriate boat speed.

A full tank will take approximately 25 minutes to completely discharge using the electric pump.

The rate of discharge in relation to the boat speed is clearly defined in MARPOL and in the case of the electric pump, which has a fixed discharge rate of 15 lt/m (which equates to 0.9 m³/h) a boat speed in excess of 5 knots is required during the discharge process. (See table below).

Speed	1	2	3	4	5	6	7	8	9	10
Discharge Rate	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Permissible Discharge Rate	0.17	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70

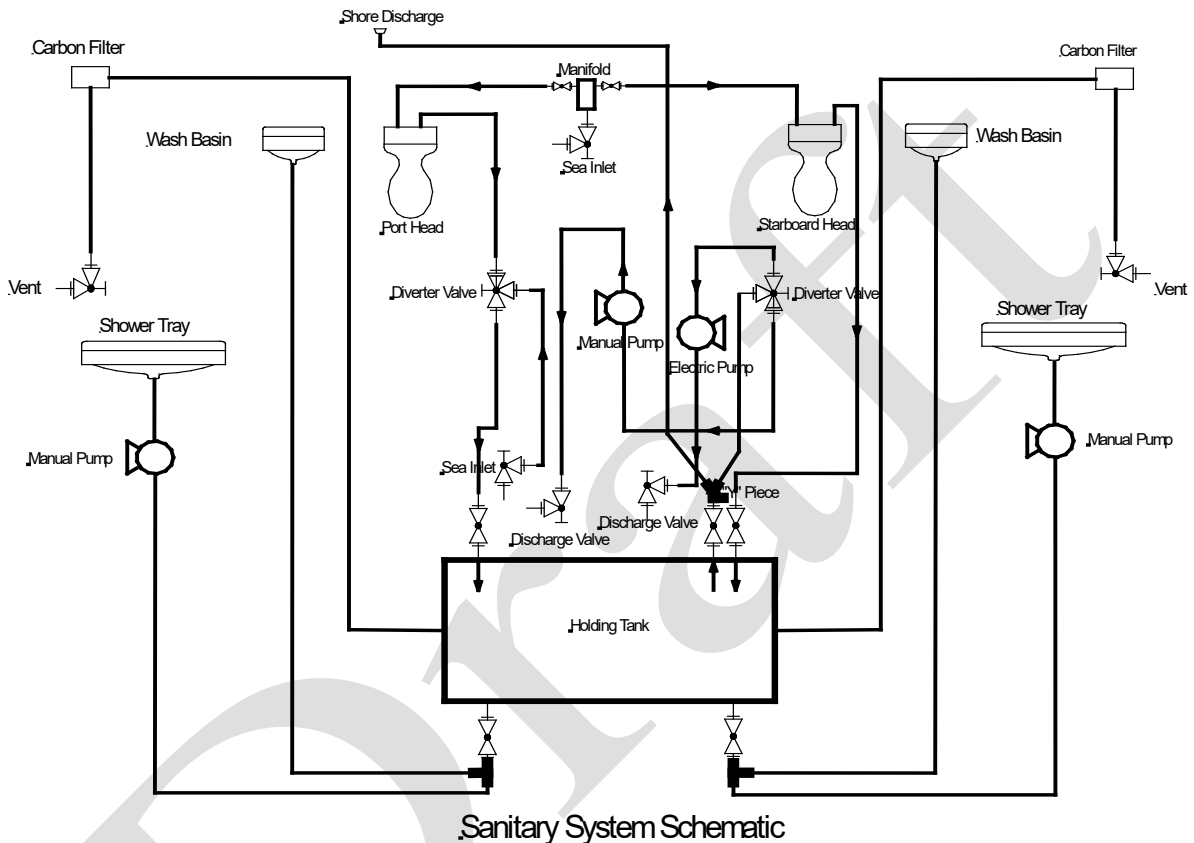
The manual pump has a lesser discharge rate so the policy is that the 5 knts minimum speed be adopted which ever method of discharge is used.

BEFORE DISCHARGE USING EITHER METHOD IS UNDERTAKEN CLEARANCE MUST BE OBTAINED FROM THE SKIPPER WHO WILL CONFIRM IF CONDITIONS FOR DISCHARGE AT SEA ARE MET.

7.1.3 Discharge to Shore Side Facility

Discharge to shore facilities is undertaken using the discharge coupling located in the port heads and a vacuum hose provided by the facility.

It is important that the correct valves are opened before discharge is commenced to prevent potential damage to the hoses between the discharge point and the tank.



7.2 Garbage

Garbage means all kinds of victual, domestic and operational wastes generated during the normal operation of a yacht and liable to be disposed of continuously or periodically, but does not include fresh fish and parts thereof or sewage. It also excludes substances and emissions prohibited or controlled under other Annexes to MARPOL.

All garbage arising on board shall be collected and bagged for disposal ashore, no items are to be thrown overboard.

Separate receptacles will be kept for;
Plastics, paper, glass and crockery,
Food waste,
General Waste

As Challenge Wales has to comply with the International Convention for the Prevention of Pollution from Ships (1973), a specific log book, called the Garbage Record Book, is maintained in which record of all waste disposed from the yacht is maintained. Instructions for the completion of this log are contained within the log itself and it is the Skippers responsibility to ensure that it is completed by the individual undertaking the disposal and signed accordingly.

Food waste may be discharged over board provided the yacht is more than 12 miles from the coast and the food is macerated to less than 25mm.

7.3 Oil or chemicals

No oil or oil bilge water is to be discharged over board, all liquid waste materials are to be stored in sealed containers or in the oily water container and discharged to specialist disposal facilities in port.

8 Propane Gas

8.1 General

For cooking purposes the boat uses Propane Gas. The bottles are stored in a dedicated compartment underneath the gratings of the aft cockpit. The compartment has 2 scuppers which drain any leaking gas safely overboard. There is provision for 4 x 13 kg bottles which are secured in place with rope lashings.

A single marine grade regulator is provided to connect the bottle which is in use and this is connected via a flexible hose to a gas leak detector. Rigid pipe is used from the leak detector through to the shut off valves being located in the galley cupboard adjacent to the hob and then to the appliances.

The system is inspected and certified on an annual basis.

A Hydrocarbon Gas, in this case Propane, is heavier than air, because of this a gas alarm sensor is located in the main bilge beneath the main saloon. The gas alarm sensor activates the main alarm system of the yacht.

If at any time you suspect you can smell gas, raise the alarm, extinguish all naked flames, isolate the gas supply using the taps in the galley cupboard, do not operate any electrical switches or equipment and vacate the boats interior. A master isolation valve for the whole gas system is located at the bottle.

It is Challenge Wales policy that the gas is turned off at the isolation valve in the galley whenever the gas is not in use, and to turn the gas off at the bottle when the gas is not being used for a prolonged period.

8.2 Connecting Gas Bottles

It is our policy to ensure that there is always at least one spare bottle of gas available. Full bottles can normally be identified by the fact that there is a plastic blanking plug screwed into the female thread of the bottle. The flexible hose is of sufficient length to attach to any of the bottles in the storage area, with this in mind, the bottles should be secured in such a way that the connection is accessible without disturbing the lashings.

Check that all appliances are turned off, the appliances are fitted with flow shutoffs so gas will not flow if the burner is not lit but turning the appliance taps off is an additional precaution. Close the isolation valve on the bottle to prevent the escape of any residual gas that might be in the bottle and also in case the bottle has been wrongly identified as empty. Disconnect the bottle using a suitable spanner from the tool box, **REMEMBER THAT GAS BOTTLES ARE FITTED WITH A LEFTHAND THREAD.**

Remove the blanking plug from the replacement bottle and check for any dirt that might have collected in the thread or seat, similarly wipe the male thread on the regulator.

Connect the regulator to the replacement bottle again remembering that it is lefthand thread, **DO NOT OVERTIGHTEN.**

Check for leaks using a soapy water solution.

DO NOT replace the blanking plug into the empty bottle as this may mislead one into thinking that the bottle is full.

Enter into the log book that the bottle has been changed.

9 Yacht Subdivision and Bilges

9.1 General Description

Challenge Wales is subdivided by 5 watertight bulkheads into 6 separate compartments plus the engine space namely:-

Forepeak, Sail locker, Forward accommodation, Main saloon, Aft accommodation, and Lazarette.

Compartments which are not connected to the bilge system are fitted with dump valves into the adjoining compartment. These are the collision bulkhead, the bulkhead between sail locker and the forward accommodation, and the bulkhead between the lazarette and the aft accommodation.

Further information regarding flooding and action to take in such an emergency can be found in the Emergency Offshore Response Plan CWM 02.

9.2 Bilge System

Challenge Wales is equipped with three main bilge pumps, two manual and one electric. The electric pump is of the submersible type, it is located in the main bilge adjacent to the main sea water inlet valve and is only capable of pumping from the main bilge. It is not automatic and requires switching on at the main switchboard.

Of the two manual bilge pumps one is located in the wet locker and the second is located on deck adjacent to the starboard halyard winch. Both the manual pumps can draw water from each of five bilges, these are:-

Engine bilge; strum box of which is in the forward end of the engine compartment.

Main Centre Bilge; strum box is on the centreline at the navigation station.

Forward Bilge; strum box is at the base of the mast.

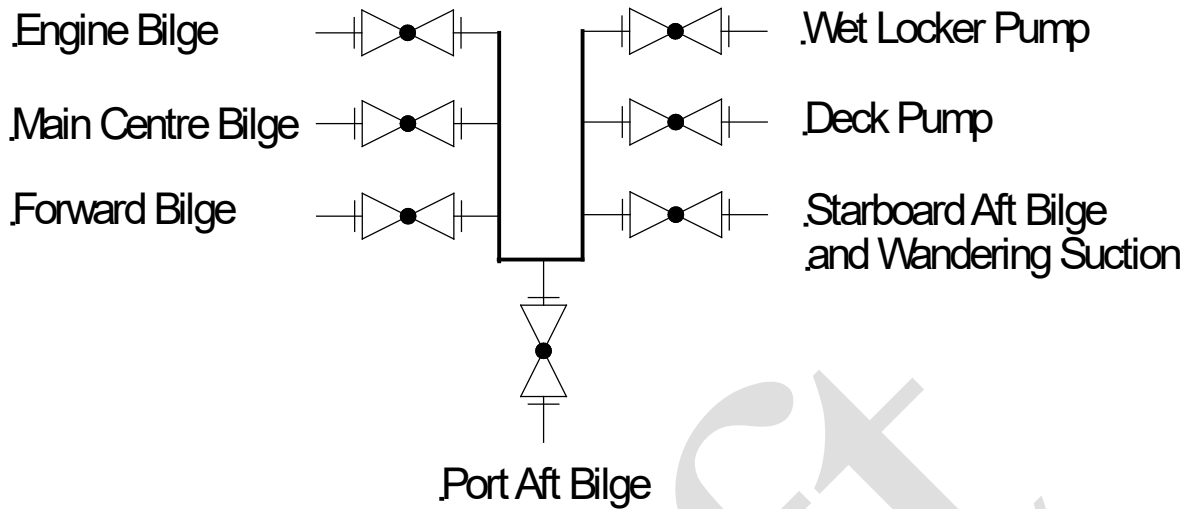
Starboard Aft Bilge; strum box aft of the watertight door to starboard aft accommodation.

Port Aft; strum box aft of the watertight door to the port aft accommodation.

Selection of which pump is used or which bilge is drawn from is made at the valve manifold located under the sole board outside the wet locker.

An additional small automatic bilge pump is positioned at the base of the mast, it is located here because there is always an element of water ingress through the mast which collects in this bilge area and keeping this area as dry as possible is important to prevent corrosion.

This pump has a manual on/off switch at the switch panel on the side of the galley fridge.



Bilge Manifold

It should be noted that a wandering suction hose is provided which will reach any compartment on the boat. The hose is permanently connected and stored in the starboard bilge compartment at the forward end of the starboard aft accommodation. To use this wandering suction the Starboard aft suction must be selected at the manifold and then the diverter valve, located in the same location as the wandering hose, positioned pointing in the outboard direction

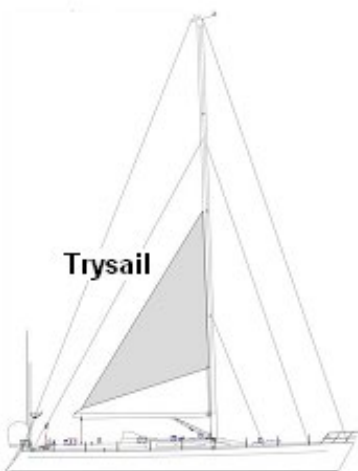
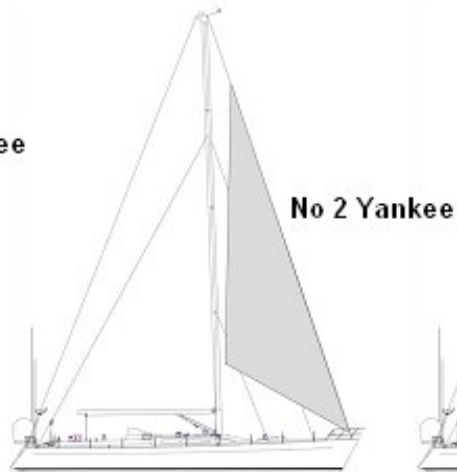
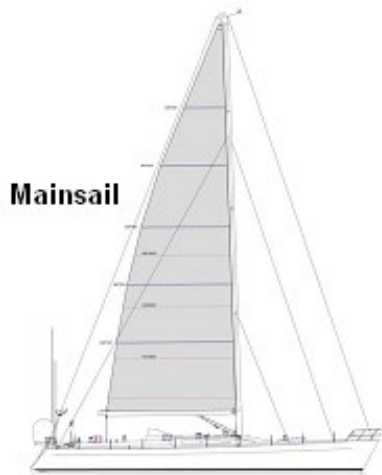
It should be noted that both manual pumps and the electric pump discharge through the same overboard discharge point located amidships on the starboard side.

9.3 Salvage/Fire Pump

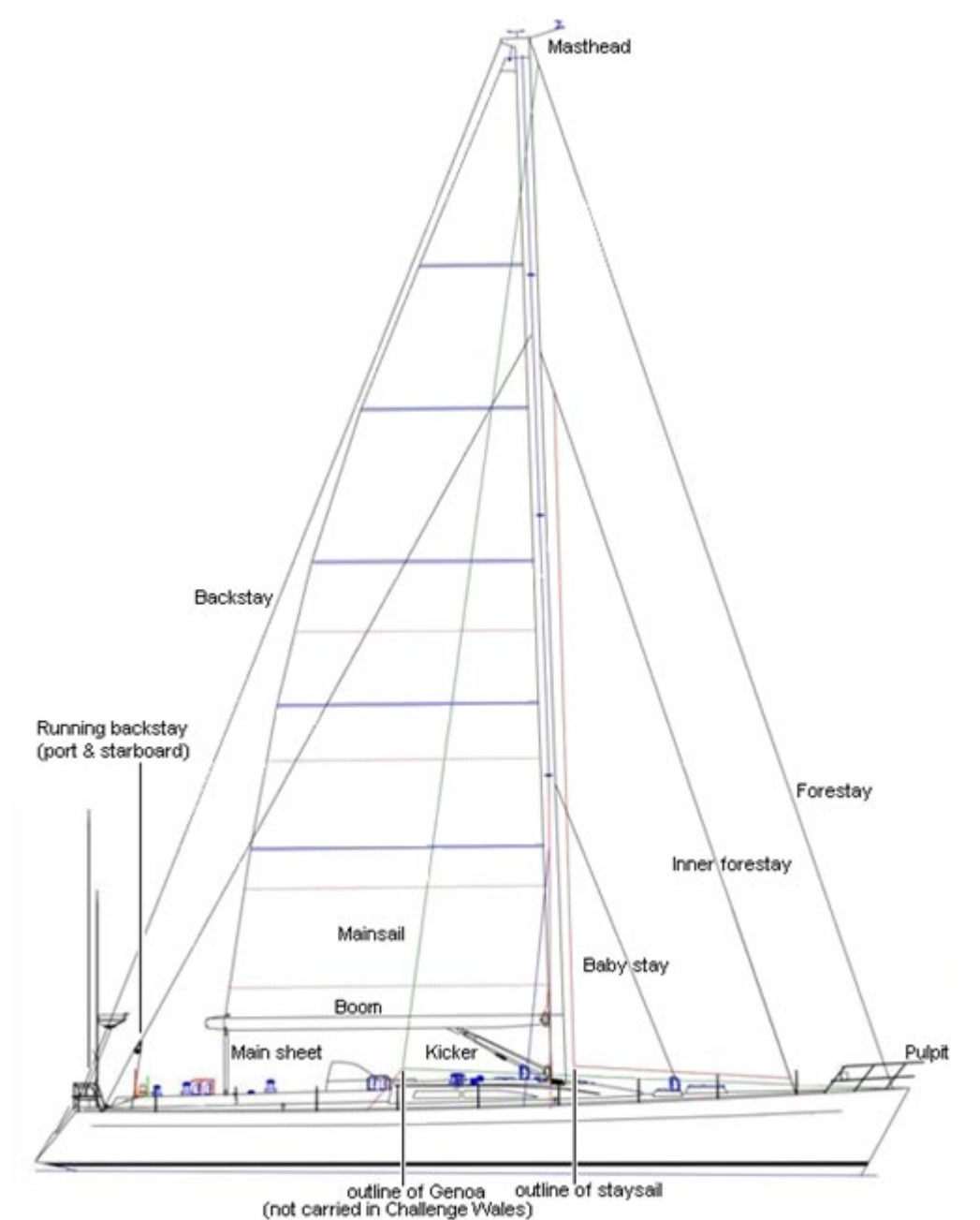
A separate portable pump is provided the primary purpose of which is to add to the firefighting capability of the boat, however, the pump may also be used for the purpose of additional pumping capability which is commonly referred to as a “Salvage Pump”. The pump is located under the sole boards of the aft starboard cabin.

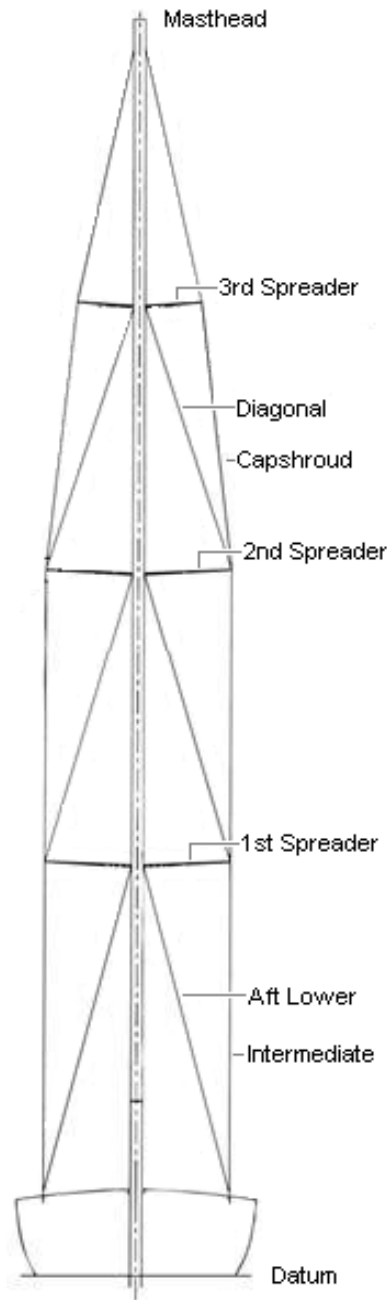
10 Sails and Rig

10.1 Sail Specification



10.2 Standing Rigging





Rig inspections are undertaken quarterly, a guide and checklist for undertaking the inspection in the planned maintenance system.

THE RISK ASSESSMENT FOR WORKING ALOFT SHOULD BE CONSULTED BEFORE ASCENDING THE MAST.

10.3 Sail Combinations

Apparent Wind Speed	Mainsail	Yankee	Staysail
0-16 Kts	Full Main	No 1 Yankee	Staysail
16-22 Kts	Full Main	No 2 Yankee	Staysail
22-25 Kts	Reef 1	No 2 Yankee	Staysail
25-27 Kts	Reef 2	No 2 Yankee	Staysail
27-35 kts	Reef 3	No 3 Yankee	Staysail
35-42 Kts	Reef 3	No 3 Yankee	Storm Staysail
42-48 Kts	Reef 3		Storm Staysail
48+ Kts	TrySail		Storm Staysail

11 The Spars

11.1 The Mast

The Mast sections are unique to the Challenge 72 Class and were specifically extruded for the yachts. The extrusions themselves were designed specifically for the rigors that the yachts would be put through when sailing around the world against the winds and currents. It is over engineered in many areas and was constantly developed as each set of spars was manufactured.

Quarterly some lucky competent person has to be hauled up the mast and should check all mast hardware starting at the top and moving in a controlled manner back down to the deck. Check each external surface for signs of corrosion or cracking. Remove any dirt or stains with a brillo pad and water to see what is underneath. Check beneath peeling paint.

11.2 The Boom

Regularly inspect each point of attachment of fittings to the boom for corrosion or cracking as per the PMS.

11.3 The Windex

The WindexXL should be removed before the mast is unstepped. Leaving the base fitting on the mast, the stem should be removed from this base.

11.4 B and G Vertical Wand

The Vertical Wand is not a standard fitting from B&G. The attachment and the plug arrangement are similarly not standard. This is principally based around the idea of being able to use a

standard B&G cable with a conventional B&G fitting which would normally be used to fit a forward facing wind wand. This means that the cable exit from the bottom of the Vertical Wand has the same plug as would normally be found on the end of a standard forward facing wand.

If a Mast Cable (the cable running from the mast head to the bottom of the mast) failure occurs this can be replaced using a standard 30m B&G cable. Should the Vertical Wand fail in some way and a replacement is unavailable then the option to fit a standard forward facing wand is available because the 'block' this fits into is already in place.

It should be noted that the Vertical Wands are very expensive and must always be removed if the mast is unstepped.

11.5 Mast Head VHF Aerial

The Comrod 1m Fibre Glass Aerial was fitted for the first time for the 2004 Global Challenge to increase the range of the VHF reception. With the aerial nearly 30m above sea level the range is increased dramatically and instances of VHF communications over a distance of 80miles have been noted.

When unstepping the mast the aerial should be unbolted from the mast wall and turned through 180deg. There should be no need to disturb the coax wire connection at the mast head.

11.6 Mast Head Lights

The Tri Colour Led light fitted at the mast head was initially fitted to cover the need to have 'emergency navigation lights' under MCA Category 0 regulations. Given the length of the Challenge 72' class, its use is against Regulations. However in an emergency it is a back up to our normal Navigation lights

There is now an LED Anchor Light combined with this light which can and should be used when on anchor whilst we still carry the dri plug hoistable light as a backup.

Deck Equipment

11.1 Snake Pit



The snake pit all stowed

In the “Snakepit” the centre winch is used for the main halyard, topping lift, outhaul, reef pennants, cunninghams and kicker. Under some circumstances these lines may also be run to the port and starboard winches if these are available.

The port and starboard winches are generally used for yankee, spinnaker, and staysail halyards, downhauls and pole up/pole down. Once the yankee and staysail have been raised the halyards remain on the winches with jammers ‘open’. This is fundamental to the MOB procedures and permits fast drop of the headsails.

It is important that whichever winches are being used for the topping lift, main or yankee halyards, the “dolly” winches must be used to ensure a proper lead is given through the jammer. Failure to do so will result in damage to both the jammer and the halyard itself. Similarly, in the case of the lines that would normally lead to the port or starboard winches, these cannot be lead to the centre winch as damage will result to both jammer and line.



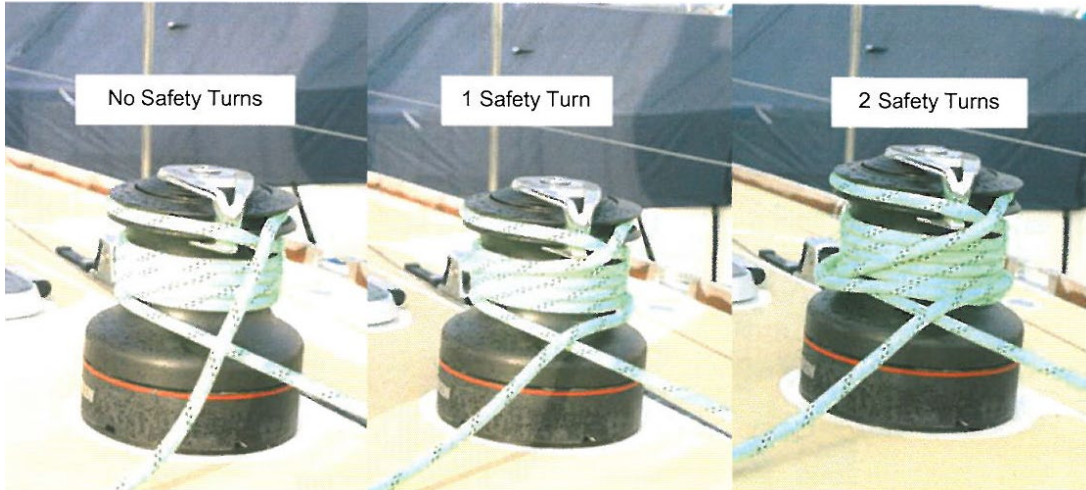
Note the use of the “Dolly winch” to give the proper lead to the centre primary winch, in this case the main halyard is being readied for a hoist

Before any action, assess what lines must be freed and ensure they are free to run during any operation. After completion, all halyards are to be coiled in a figure “8” and looped over their respective winches, other lines are coiled clockwise and attached to their appropriate strap. The coils should be in the same order as the lines come from their jammers.

Leave this area in a condition that you would like to find it.

In any operation requiring the side winches, the headsail and staysail halyards can be removed from the winches by applying the jammer. They must however be reinstated once the winch becomes free.

11.2 Winches



Before using any of the winches it is important that the correct method of holding the line in question is adopted. The line should be held with the palm of the hand facing down and the little finger towards the winch. With this grip if the load on the winch overpowers the operator then by opening the hand the line would fall safely to the deck without causing injury to the hand such as a rope burn.

Holding the line in the “handshake” type grip could result in a rope burn injury and possibly the thumb being drawn into the winch and getting trapped in the turns on the drum with severe consequences.

In preparation for use, the line should be loaded in a clockwise direction with two turns on the drum. As soon as any tension is experienced in the line a third turn must be applied. Any delay in doing this could result in the operator being overpowered by the line as the load increases.



After pulling any slack, a further turn should be added and then the line is fed into the self tailer with a sharp tug to lock into position. The winch handle is then fitted into the top of the winch and turned initially anti-clockwise and then clockwise.

When the operation is completed, the winch handle is removed and two loose safety turns are laid around the winch.

To release the line on the winch, the safety turns are removed; the line removed from the self tailer keeping the tension in the line. The initial tension is removed by easing the line with the left hand on the

drum and palming the line towards you. After that the line can be slackened and turns taken off the drum. One turn to remain on the drum at all times.

When using the winch, stand up, position your torso over the winch, face forward and pay attention to what is happening to the sail and anyone calling the trim.

If at any time when manually tailing a line on a winch the operator finds they are being overpowered through insufficient turns being on the drum they should let go of the line in question, attempts to put on an additional turn should be avoided as there is a significant risk of personal injury.

11.3 Jammers

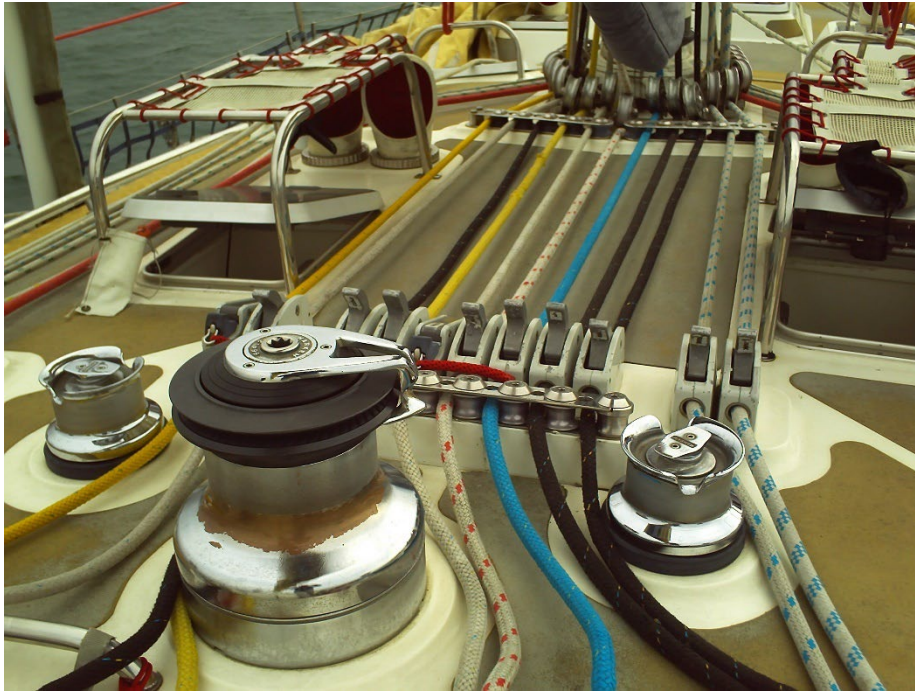
Since it would be impractical to provide a separate winch to deal with all the various control lines, jammers are provided within the 'snakepit' area. These devices are of two different types but the purpose is the same and that is to grip a line under tension which enables winches to be freed for other purposes.



Jammers should not be released under tension, the line should be first loaded onto a winch and a small amount of tension applied allowing the jammer to be released by hand. Releasing under tension will cause damage to the line in question and the sudden, uncontrolled, release may cause other damage or injury to individuals.

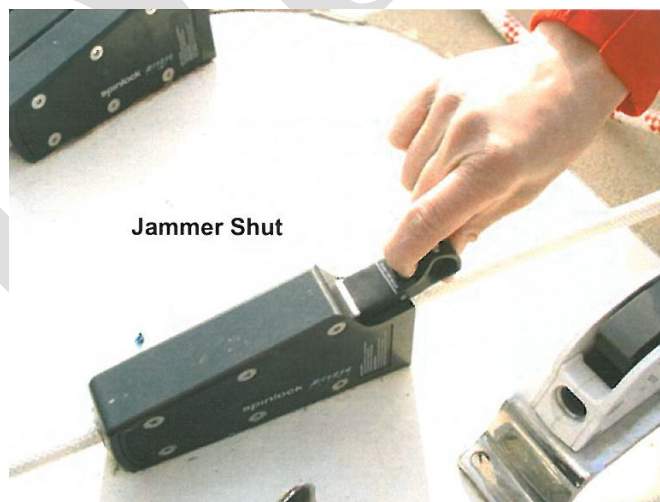
The jammers shown in the picture are of the cam lever type, in this case on the starboard side of the snake pit, they are from left to right, spinnaker halyard, pole downhaul, starboard staysail halyard which doubles as the pole uphaul, pole up and pole down on the mast. It should be noted that the pole up is of a smaller diameter than the other lines and because of this it is backed up on a cleat when being used to prevent slippage.

The jammers on the port side of the snake pit are exactly the same but in the reverse order.



Centre bank of jammers and centre primary winch

The centre bank of jammers are shown in the picture above, from left to right the lines are:- Main halyard, topping lift, port Cunningham, No. 2 reef pennant, mainsail outhaul, kicker, No 1 reef pennant, No 3 reef pennant, starboard Cunningham, port yankee halyard, and starboard yankee halyard.



Type of Jammer used for the main halyard and outhaul.

The jammers used for the main halyard and outhaul are of a different design and rely on a wedge as opposed to a cam to obtain the desired grip. Again these cannot be released under load and can only be released when there is either no tension in on line or when the tension is transferred

to a winch. After the main sail lift, the jammer needs to be re-set by pulling the toggle out from the back and allowing the jammer to slide back whilst carefully easing the halyard off the winch.

11.4 Dolly Winches or Snubbers

These technically are not winches at all but are used to give a suitable 'lead' from a halyard or other control line to one of the primary winches. Specifically they are used to 'lead' the main halyard, the topping lift, or either of the yankee halyards to either primary winch. Leading either of these lines to a primary winch without using the dolly will result in damage to the line in question and also to the jammer. For the same reason any of the lines from the outer bank of jammers, such as a spinnaker halyard, should not be run to the centre primary winch.

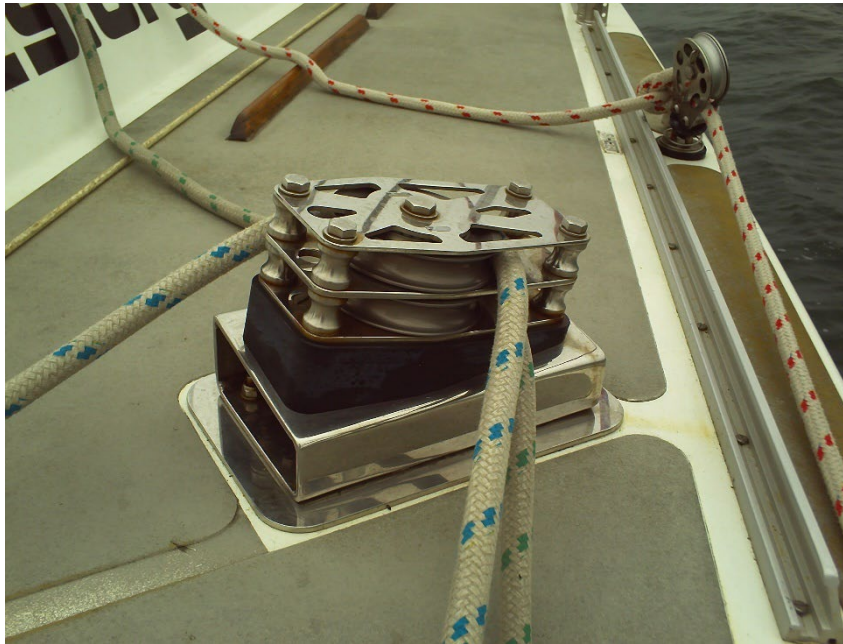


Dolly winch being used with the main halyard.

The dollies can also be used to temporarily secure a halyard, typically the main halyard, by putting 3 turns on the drum and securing the tail with the small jammer cleat on the top of the unit. If you are doing this it is important that 2 safety turns are used as the line is likely to release itself.

11.5 Turning Blocks

The deck blocks shown in the picture below are known as a turning blocks, they re-direct the headsail and staysail sheets from their respective deck cars to the winches.



Deck turning block

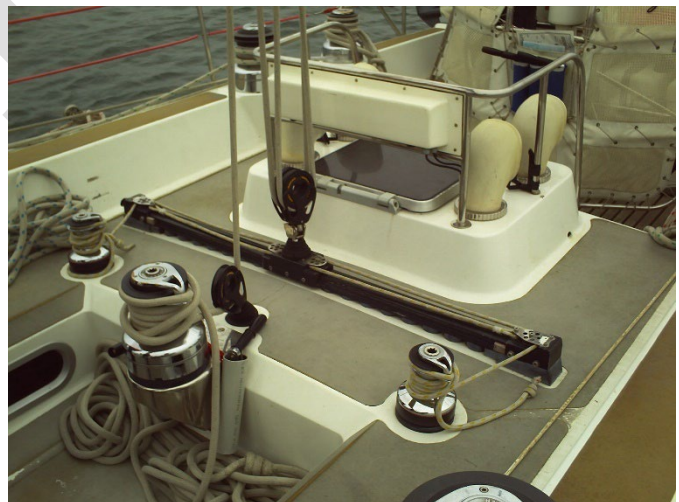
It does not matter which of the sheets goes through which sheave provided there are no twists in them.

11.6 Main Sheet Traveller

This aids control of the shape of the main sail and is operated by small winches on each end of the traveller and the main sheet itself. There can be significant tension in the line when the main sail is in use and care should be taken to control movement.

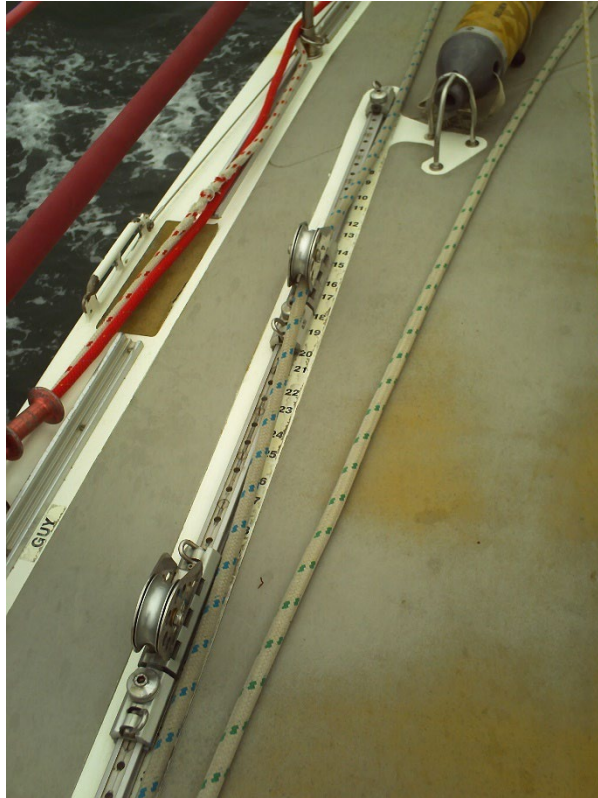
There is a significant risk of injury from the traveller and no one should sit either side of the traveller.

See notes in Section 5.7 regarding NGZ



11.7 Deck Cars

There are two “Cars” on each side of the boat, the forward one positioned inboard of the main shrouds is for the staysail and the second aft of the shrouds is for the yankee. Both sets of cars can be adjusted to give the optimum sheeting angle for the particular sail and wind strength.



Deck Car for the Yankee, port side.

If at any point it is decided to adjust the cars it is best done when there is no load on the sheet i.e. when it is on the weather side. If it is necessary to adjust the sheet lead that is under load then a “rope stopper” should be applied to the sheet and the load transferred to it before an adjustment is undertaken. When the sheet is loaded there is considerable force trying to force the car aft along the track which can easily result in injury.

The car is adjusted using an Allen Key which stored on the shelf just inside the companion way hatch.

12 Headsails

12.1 Retaining Lanyard

This is a Dynema line which is attached to the deck at the base of both the main Forestay and the Cutter/Inner Forestay. The lanyard is approximately 1.5mts long and has a standard snap shackle on the free end. The lanyard has a couple of purposes both of which require it being connected to a rope strop attached to the end of the respective halyard, it should never be connected to the head of the sail itself.

In the case of rigging the headsails prior to departure, or when the sail is fully rigged but not hoisted, the lanyard is used to stop the sail being partly hoisted and enables the slack to be taken up on the halyard.

The other purpose of the lanyard is when the halyard is being disconnected from the sail, especially during a sail change, and there is movement on the boat. Using the strop ensures that the halyard is always attached to something at deck level and not reliant on an individual holding it therefore alleviating the possibility of the halyard becoming free and could potentially to run to the top of the mast.

When not in use ensure that the free end of the lanyard is connected to the rope strop around the stay just above the rigging screw. If this is not done then the end of the lanyard will go overboard and cause damage to the topsides.

Care should be taken to ensure that there are no other lines trapped between the lanyard and the adjacent stay. This is particularly valid with the staysail where the lazy yankee sheet is prone to being trapped causing problems when a tack is executed.

12.2 Yankee

The yankee is flaked into a long sail bag with open ends and a zip running its full length unzipping from foreward to aft. The reason for this is so that the sail can be fully rigged for the hoist without removing it from the bag and therefore keeping it under control in windy conditions. The tack, all the piston hanks, the head and the clew can be attached while the sail remains secure in the bag.

The sail wardrobe contains 3 Yankees and they can be identified by the number of red stripes on the sail bag, 1 stripe for No 1, 2 stripes for No 2 etc.

No 1 and No 2 yankee attaches directly to the snap shackle at the base of the forestay while in the case of No 3 there is a webbing strop or becket on the tack which enables the sail to set slightly higher off the.

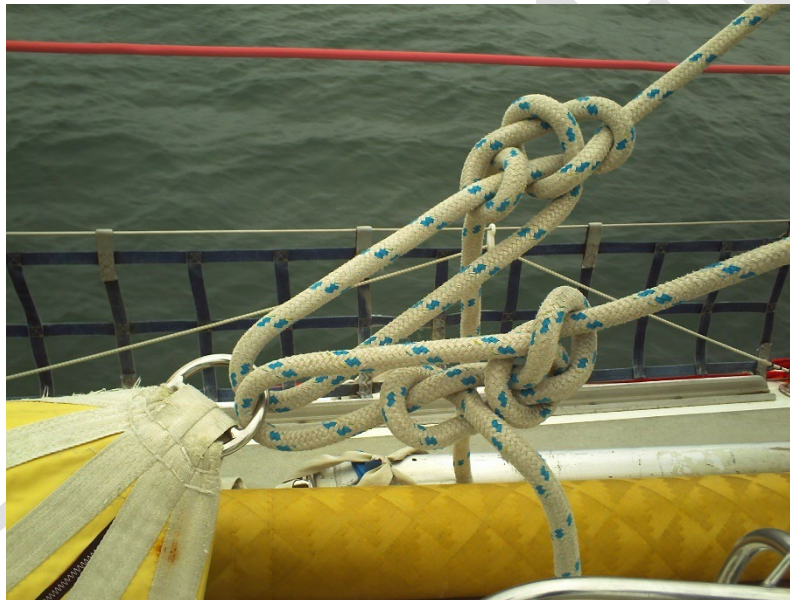
When attaching the halyard make sure that there are no twists around the forestay or that the head of the sail has not rotated around the forestay which will have the same effect. If the sail is

hoisted with a twist in the halyard it is very likely that damage will be done to the halyard, the forestay, or both.

Once the halyard is attached the retaining strop should be attached to the rope strop on the halyard snap shackle, this will enable the halyard to be tensioned without the sail being hoisted. The retaining strap should not be clipped around the forestay.

When releasing this strap it is important that it is reattached to the rope strop around the forestay just above the rigging screw, if it is left to fall to the deck it will go over the side and cause damage to the paintwork of the topsides.

Once fully rigged the sail should be moved to the "Toe rail" and secured using the elastic bungee cord provided for this purpose.



Sheets should be attached to the clew with a bowline and half hitch

12.3 Stay Sail

The Staysail is stowed in a standard sack type sail bag so it is easily identified. It attaches directly to the deck in the same way as Yankee No 1.

The sheets are attached to the sail in the same way as with the yankee but the bowlines must be kept short as when the sail is sheeted in tight there is little distance between the sail clew and the deck car.

When attaching the halyard make sure that there are no twists around the forestay or that the head of the sail has not rotated around the forestay which will have the same effect. If the sail is

hoisted with a twist in the halyard it is very likely that damage will be done to the halyard, the forestay, or both.

Once the halyard is attached the retaining strop should be attached to the rope strop on the halyard snap shackle, this will enable the halyard to be tensioned without the sail being hoisted. The retaining strap should not be clipped around the forestay.

As with the Yankee when releasing the strap it is important that it is reattached to the rope strop around the inner forestay/clipper stay just above the rigging screw.

Once fully rigged the stay sail should be secured with sail ties to the grab rail on whichever side of the centre line is appropriate, **DO NOT SECURE THE STAY SAIL ON TOP OF THE YANKEE AT THE TOE RAIL.**

12.4 Hoisting Headsails

12.4.1 General

The process for hoisting the Yankee and the Staysail is much the same. As with everything we do safety is the priority and with this in mind it is important that anyone who is not directly involved in the hoist should be positioned aft of the mast clear of flogging sheets.

The normal procedure is to hoist the Yankee first and then the Staysail but this may vary according to circumstances and the Skipper will nominate which sail to hoist first.

One person will be positioned forward of the sail being hoisted ready to release the dyneema strop. Two others will be positioned at the appropriate halyard, one at the winch in the Snakepit to back up the two at the mast and another at the appropriate sheet.

The halyard should have 2 turns around the winch drum during the initial stages of the hoist of the sail. It is important to remember that the Yankee halyard must have at least one full turn around the starboard dolly winch before it is fed to the starboard primary. Failure to do so will put excessive load on the jammer due to the direction of pull from it and may also damage the halyard itself due to the sharp exit from the jammer.

The early stages of pulling on the halyard will be easy compared to that of the mainsail and straight pulls without sweating will be all that is required. It is important that care is taken not to be too enthusiastic with the initial pull as it may result in the participants falling over and injuring themselves and when on the lee side may result in falling overboard.

The individual in the Snakepit, who is backing up the halyard, should assist the hoist by pulling not only the slack generated by the two crew members “sweating” at the mast but help them by pulling continually during the hoist process.

The job of the person on the sheet is to ensure that the clew of the sail is kept under control and not allowed to flog during the hoist. This is done by keeping a little tension on the sheet but not so much as put wind in the sail and make it difficult for the mast team to hoist the sail. This role

can be co-ordinated with the helmsperson who can luff up to the wind or bear away to create the same effect.

Upon confirmation from the aft guard the sail ties can be released and the dyneema strop unclipped and re-clipped as described above. At this point all personnel should retreat aft of the mast to be clear of flogging sheets which can cause serious injury.

The hoist must be monitored through-out by the person in charge; things to look out for are the halyard fouling on anything aloft such as the ends of the crosstrees/spreaders or, in the case of hoisting the yankee with the staysail already set, the luff hooks of the staysail. He/she should also check that the halyard is being backed up fast enough by the snakepit and that an unexpected amount of effort is being required to complete the task. If things seem heavier than usual there is probably something caught, jammed, or incorrectly rigged, CHECK IT OUT, DON'T ASSUME THE ANSWER IS TO PUT MORE EFFORT INTO THE HOIST PROCESS.

Once the hoist is completed to the capability of those at the mast the hoist is transferred to the snakepit. Two additional turns should be placed on the winch, secured in the self tailer and tensioned to the call of the Mate/Watchleader.

The best way to judge tension is by looking at the luff of the sail, if there are creases radiating from each of the luff hooks then there is insufficient tension, if there are vertical creases running parallel to the luff then there is excessive tension. When making this decision consideration should also be given to wind strength, greater tension will be required for stronger apparent wind. In very strong winds some radiating creases is almost inevitable but parallel creases should never be seen in lighter winds.

Once the sails are hoisted and final tension set the usual safety turns should be applied on the winch drum. DO NOT APPLY THE JAMMER on these halyards, these are left on the winches to facilitate a quick sail drop in the event of a Man Over Board situation arising.

Finally, the halyards should be coiled around the winch in a figure "8" format starting at the winch and coiling to the rope tail.

12.4.2 Yankee Hoist

It is important that the plastic chocks are in place on the forward mooring cleats; these prevent anything catching on the cleats which will almost definitely result in damage.

As mentioned above the Yankee is normally the first of the headsails to be hoisted. The Mate or Watch leader, whichever is in charge on deck at the time, will confirm with the Skipper/Mate back aft that all is ready for the hoist before the hoist is commenced.

The process is as described in 15.4.1, special attention should be made to the fact that with the high cut of the yankee style sail there is more chance of injury from flogging sheets.

12.4.3 Staysail Hoist

There are no special points to mention about the hoist of the staysail and the procedure should be as described above.

12.5 Lowering Headsails

12.5.1 General

The way the headsails are lowered can greatly assist the final flaking of the sails and bagging. Needless to say a lot will depend on the circumstances and conditions at the time but what is essential is that the task is undertaken in a controlled way. Another point to consider is that of the wind, it may sound a strange thing to say but use the wind to assist you rather than fight it.

12.5.2 Staysail Drop

12.6 Changing Headsails

12.6.1 General

There are two basic options for changing headsails Option 1 is to remove the working sail completely and stow it away and then hank on the replacement sail, hoist, and set. The second is what some people call a racing change; this is where the replacement sail is hanked on to the forestay with the working sail still flying.

The advantage of the latter is that the boat will be sailing “bareheaded” for a shorter period of time which is important when racing but for general sailing is of little importance. The disadvantage of the latter is that during the transition you will have a lot of sail loose on the deck and also the crew member at the forestay pulling the working sail down has to stretch to reach the sail coming down to unhook it which can be a precarious position, especially when changing down which by the nature of the fact that you are changing down means that the weather and sea state will have deteriorated and the boat become more dynamic.

12.6.2 Option 1 (Conventional)

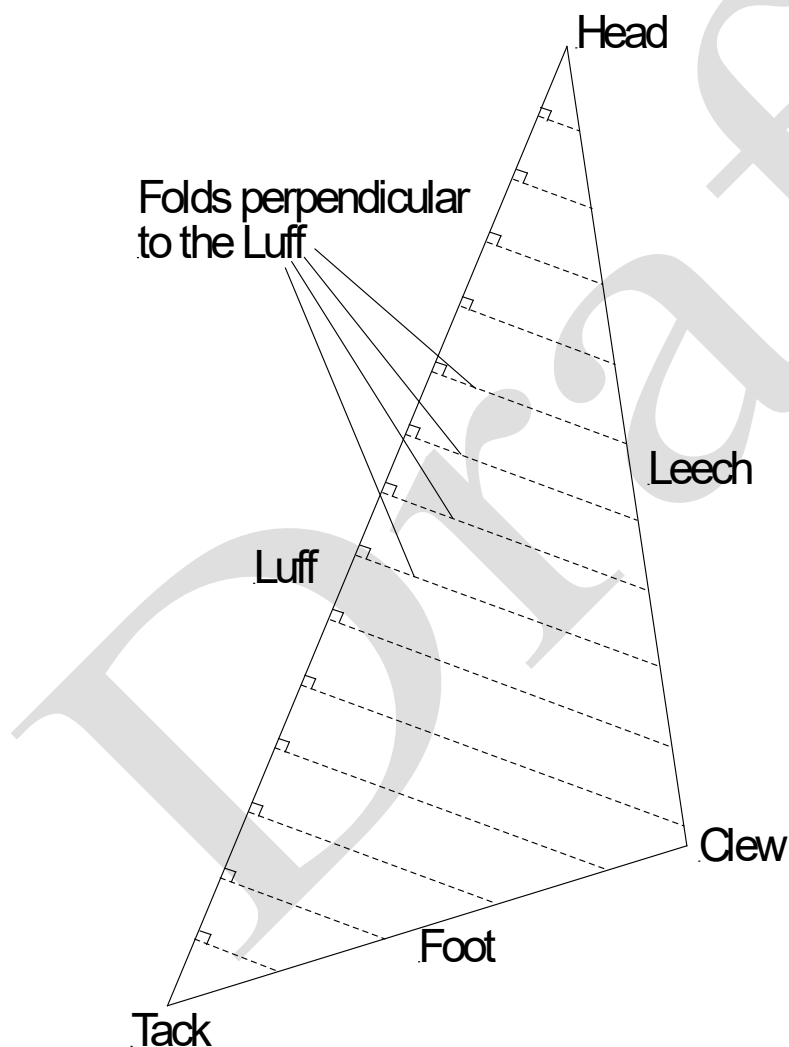
This is the method we would usually use with young people on board as it has reduced risks for individuals undertaking the task.

Firstly the halyard should be prepared for the drop. The halyard, which should have been coiled in a figure “8” style around the winch, should be carefully lifted off the winch, turned upside down, and laid on the deck clear of anyone’s feet. This halyard should now be able to run free but a visual check should be made to ensure that it is not tangled or likely to become so.

12.7 Flaking Headsails

The folding of sails is known as “Flaking.” The sail is folded in a concertina way which ensures that no twists are put in the sail, the sail will hoist ‘cleanly’ and will be easily handled when bagged.

As mentioned above in 11.2 the sail is in the sail bag in such a way that we can hank the sail onto the forestay without removing the whole sail from the bag. To achieve this the folds of the sail have to be perpendicular to the luff. This is where the confusion of folding sails, particularly the yankee which has a high cut Clew, begins as the folds do not run parallel to the foot of the sail.



The drawing above is indicative only to show the way the folds are at right angles to the luff of the sail, there may be more or less actual folds depending on the size of the folds and which sail is being ‘flaked’.

If the sail was folded parallel to the foot you can see that the luff of the sail would be running the full length of the sail bag and beyond making it difficult to attach the luff hooks to the forestay

and the sail bag would have to be totally unzipped making the sail difficult to control in any wind.

Deck space is obviously limited for this process so the best way to tackle it is to have the sail roughly on the deck to one side of the boat with the foot of the sail on top.

Place the sail bag on the deck on the opposite side of the boat making sure that the bag is the right way around so that the zip closes from aft to forward. The sail can now be flaked directly onto the bag and the bag zipped up afterwards.

The flaking is best achieved by having one person positioned at the luff and a second person positioned initially at the foot and then moving to the leech once the first few folds are completed. Two other crew members can then feed the sail to them as required.

The first fold can be achieved by tucking the tack and the first 2 feet of the luff underneath the sail so that the luffs are parallel therefore creating a right angle between the fold and the luff. As can be seen the fold created is only about 3 feet long but it does give you guidance for the subsequent folds.

The person at the luff should now hold the luff at the point where the head rests and with the other hand reach up the sail the same distance as the first fold and bring this second fold down assisted by the second person on the foot who will see that the folds lay flat.

After the first couple of folds you will find that the process is made easier if the two individuals doing the folding pull against each other along the folds to form a crease. This will keep the folds straight and stop it puckering up underneath.

The first few folds are the fiddliest up until you reach the clew of the sail, after this it should be plain sailing.

13 Running Backstays

The running backstays are used to provide additional support to the mast particularly at the point where the Inner Forestay (Cutter Stay) and staysail are attached. The requirement to support the mast in this area depends on wind strength, sea state and sail shape, whether to use them and to what tension will be decided by the Skipper.

Mainsail

13.1 Hoisting

Prior to hoisting the mainsail it is important to check that all lines that are associated with the mainsail hoist are free and clear to run, these include the main sheet, the reef pennants, kicker and topping lift. The kicker should be checked that it is released and the boom is high enough to ensure the boom is supported by the topping lift through-out the operation. Finally the running backstays are moved into the forward position so that they do not impede the hoist of the sail..

Before the sail ties are released clearance must be obtained from the Skipper. The hoist will normally take place with the wind fine on either the port or starboard bow and the Skipper will nominate which prior to giving clearance to proceed with the hoist. It is also important to ensure that all personnel are to windward of the boom before the hoist is undertaken to prevent injury from the sail and battens as they fall clear of the boom.

The sail tie that secures the headboard of the sail should only be released when the actual hoist is to commence, if it is released too early there is a chance that the slack that will result in the main halyard will be sufficient to enable the halyard to get caught on the running backstays which may in turn require an ascent of the mast to clear.

During the hoist the Mate should be monitoring what is happening at the mast, in the Snake Pit, and up the mast to insure there are no snags. If excessive load is experienced at the halyard then the reason for this MUST be identified rather than applying additional force to the hoist such as winching.

The person on the main sheet should be ensuring that the mainsail does not fill with wind but also remains under control without unnecessary flogging of the boom, this should be done with liaising with the helmsperson who can achieve much the same effect by heading up or bearing away as appropriate.

Initially the sail can be hoisted with a direct pull of the halyard but as more sail is hoisted the load will become heavier and it will become necessary to “sweat” the halyard.

13.2 Sweating a Halyard

The halyard should be gripped at shoulder height and pulled away from and at right angles to the mast. The maximum advantage is gained during the initial stages of this pull so once your hands have moved approximately 2 feet from the mast you should move your hands back towards the mast and down at the same time keeping tension on the “hauling part”. The person tailing the halyard should pull hand at this point to assist the mast man by taking in the slack. Once all the slack has been taken up to the winch the procedure is repeated.



The final tension on the halyard is undertaken by the winch and the amount of tension called by the Mate. It is easy to over tension the luff of the sail and the amount of tension is critical to get the maximum out of the sail. Without going into the finer points of mainsail trim a good indication of sufficient tension is given by the shape of the sail battens, if the bottom battens start to deflect into an “S” shape then there is too much tension and this will result in the leech of the sail “falling off” when the sail is sheeted in.

Feeling the tension in the bolt rope on the luff of the sail can give an indication of tension but is not the definitive indicator. Remember the amount of tension required will vary with the wind strength and fine adjustment can be made using the Cunningham.

Once the halyard tension has been set then the topping lift should be eased and the kicker applied. As with halyard tension kicker tension can be critical for mainsail trim and can be effected by wind strength and the point of sailing. When sailing hard on the wind down force on the boom can be better controlled using the traveller and puts less stress on the boom itself.

13.3 Mainsail Reefing

13.3.1 Reefing Down

Reefing is the method used to reduce the area of the mainsail as wind strength increases. A guide of wind strengths is shown in the earlier section on sail combinations, remember this is only a guide and relates to APPARENT wind not TRUE wind so the point of sailing will effect this.

Preparation

As with any operation undertaken on the boat start with preparation, think what lines are going to be affected by the operation and make sure they are free and ready to run as necessary. The

quicker and smoother this task is undertaken the safer the task will be and the less wear and tear on the gear with flogging sails and lines.

Additionally, what winches will we require for this evolution; we have 3 winches in the snake pit but, assuming all sails are set, 2 of these will be occupied with the headsail halyards. To facilitate a quick operation it is recommended that these winches be freed of the halyard by applying the appropriate jammer and easing the halyard on to it. Main Halyard should be on the Port winch with the jammer released and 2 safety turns on. Cunninghams prepped (see below) the kicker on centre winch with jammer off and 2 safety turns on. Reefing pennant on starboard winch and if reefing down to 1st reef this can set with 2 turns ready to take in. If reefing to 2nd or 3rd reef then the current reefing pennant must be loaded on winch with jammers off and 2 safety turns as this will need to be eased during the evolution with the next reefing pennant ready to use.

In an ideal situation we try to reef on set tacks as this keeps the spare falls of canvas tidy using spare pennants. A tidy reef also makes it easier to connect spectacle rings to the Cunninghams.

- Reef 1 – Port Tack
- Reef 2 – Starboard Tack
- Reef 3 – Port Tack

In this situation for reef 1 & 2 the Cunninghams are pre tensioned and jammed off. Remember this will have the halyard tensioning against it and the knot of the cunningham needs to be touching or very close to the feeder on the mast once tensioned. 3rd reef will require the Cunningham to be loose to lift onto spectacle ring. In this situation reef 1 will need to be removed from spectacle to free up a Cunningham

Topping lift will need to be on before we drop the main sail, this uses the same dolly as the main halyard but on this occasion it only needs to be hand tight or if already under load do not release.

Safety Points to consider are:-

- When we ease the main halyard, the boom is going to drop, so double check the topping lift jammer is on
- The leeward winch is likely to be under the sail if using 3rd reef. Helm to ensure course to allow also for boom to be out enough to give space but not too far so that it is flogging on spreaders and runners.
- Reefing down again to 2nd or 3rd reef we need to stop the first pennant from ripping the sail. Before easing the main halyard you must ease the current pennant so that full weight is on the topping lift

Task

Skipper, Mate or Watchleader (who is running the exercise, make it clear)

Once all stations are ready finally check with helm before starting exercise.

Scandalise the sail (KMT)

- Release the kicker and
- Ease the main sheet,
- Pull IN the topping lift by hand with both these eased the boom will lift quite considerably. With one person applying the pull and another operating the jammer you

should be able to apply enough tension to the topping lift to support the boom in a position which is higher than the final height of the boom when the reef is complete. This means that when tensioning the reefing pennant the effort will be only in gathering in the sail and not lifting the boom as well.

Assuming that both the Cunninghams are fully tensioned and secure in their respective jammers, the next task is to lower the mainsail. This is done in the normal way but there is a tendency for people to air a little too cautiously and ease the sail an inch at a time,; remember that the main halyard is on a 2 part purchase so that means for every foot the sail is lowered, 2 feet of halyard will have to be released, and as there is approximately 10 feet between the tack of the sail and the 1st reef and a similar distance between 1st and 2nd reef etc. then we clearly need to drop 20 feet of halyard. To help with this the halyard is marked with 1 black mark for reef 1, 2 marks for reef 2 etc. These mark the position of the halyard at the jammer. Note these are only guides and more final adjustment may be necessary and the mast man will make the call for more slack if it is required to attach the Cunningham.

The attachment of the Cunningham to the respective Spectacle ring, this is normally easier on the windward side as its away from the falls and more a more stable position.

Sometimes, especially when putting in the 3rd reef it may be necessary to release the Cunningham and take it to the ring instead of the other way round. If this is the case be sure to tension the Cunningham again before applying halyard tension.

During the above operation it is beneficial to have a crew member pulling in the slack that will be created in the respective reefing line as the sail is lowered. This however must be done with caution as the line will snatch as the sail flogs so any slack gained should be backed up by the lines jammer. This also prevent the loop catch crew at the stern of the boom. So should also be do to some extent on the lazy reefing lines

Once the halyard tension is set the reefing line can be winched tight. Tension on this should be called by someone aft as there is the possibility that as the sail gathers there is a chance that damage will be done to the sail by the pennant as it passes through the leech reef sheave.

When the reef pennant is tight and secure the topping lift can be released and the main can be sheeted in and trimmed as required and the kicker applied.

Remember it is important that the Cunningham should be tight and full down against feeder then the main halyard is tensioned prior to putting load on the reef pennants. **DO NOT OVER TENSION THE HALYARD.**

13.3.2 “Shaking Out” a Reef

The process for this is much the reverse of putting the reef in. Preparation is the first thing, think carefully as to the mechanics of what you are about to do and what lines will be affected, for instance all the reef lines above the reef you are releasing will need to run free to allow the sail to go up.

Check that if you are shaking out one reef to another reef, such as going from the 2nd reef to the 1st, the reef you are going to is secure, this is especially important at the Cunningham, failure to do so could result in damage to the sail slides and possibly mast track.

Put the main halyard on the winch, tension and release the jammer and leave 2 safety turn in ready.

KMT - Release the kicker, ease the main and take up the slack on the topping lift, normally hand tight on the topping lift is all that is required.

Next ease the Reefing Pennant until the boom is supported by the Topping Lift. Once the weight is on the Topping Lift the Reefing Pennant can be released completely.

Once this is done ease the halyard a little to ease the load on the Cunningham, then release the Cunningham using the spike. **Note the Cunningham should never be released before the reefing pennant.**

We can now hoist the main, whether this is done by sweating at the mast or whether it is winched all the way will depend mainly on the relative wind direction. If the wind is well forward of the beam then sweating should be possible providing the main is not allowed to fill with wind by the main sheet trimmer.

If it is necessary to use the winch then it is important to monitor the sail through-out the operation in case the sail fouls on the rig such as the spreaders or running back stay.

13.3.3 Reefing Quick Summary

Reefing Down

Preparation in essential (save time for sail, boom and lines flogging)

Confirm who is leading exercise!

Lead must check all stations are ready before start (Mast, Snakepit, Mainsheet, Helm)

Scandalise Main Sail (Kicker off, Main sheet out, Topping Lift on by hand)

IF 2nd or 3rd Reef is next ease the current reefing Pennant to fully load the topping lift.

Drop Main quickly to the relevant mark.

Connect Cunningham to spectacle ring (normally on leeward side) and tension if loose.

Remove most of the slack on all reefing pennants to stop any big loops catching crew

Tension Main Halyard, check Cunningham hasn't slipped (max 2cm from feeder)

Tension Active Reefing Pennant

De-scandalise Main (Topping lift off, Kicker on, main sheet in)

Trim if required.

Tidy up –

Pull in slack from all other reefing pennants and adjust loops in main cockpit to hold spare canvas. (if required use sail ties as bunt lines DO NOT TIE AROUND BOOM)

Topping lift in by hand

Foresails back on winches, jammers off with 2 safety turns

Tidy up snakepit

Sailing change recorded in Log and check course

Shaking Out

Preparation in essential (save time for sail, boom and lines flogging)

Confirm who is leading exercise!

Lead must check all stations are ready before start (Mast, Snakepit, Mainsheet, Helm)

If going to next reef ensure next spectacle ring is secure and tension with Cunningham

Scandalise Main Sail (Kicker off, Main sheet out, Topping Lift on by hand)

Easy and release the current reefing Pennant to fully load the topping lift

Use spike to release Cunningham

Hoist main & Tension Main Halyard

If going to next reef then Tension Active Reefing Pennant

De-scandalise Main (Topping lift off, Kicker on, main sheet in)

Trim if required.

Tidy up (as above)

Sailing change recorded in Log and check course

13.3.4 Dropping the Mainsail

As with any operation the first thing is preparation. Make sure the main halyard is clear to run, best practice here is to reverse flake the halyard on the deck starting at the free end. The topping should be left on at first to keep boom secure

Both running backstays should be in the forward position.

One person should be positioned at the main sheet to haul in the slack as the sail is initially lowered, this can be done by hand, there is no need for a winch handle.

Someone needs to get into one of the climbing harnesses. This persons roll will be to climb the mast by way of the folding steps and secure themselves to one of the eye plates where the halyards exit the mast, generally this is the one on the port side of the mast where the staysail halyard exits. Their job is initially to make sure the flakes of the sail go to alternate sides. Note that the Cunningham rings and the 3 sets of spectacle rings should all go to the same side to make the final flaking of the sail easier. Which side the rings go will be nominated by the Skipper but will normally be the windward side.

The main halyard needs to be put on the winch, tensioned and the jammer released. Once everyone is in a safe position i.e. not on the deck on the leeward side where the sail will come down, clear of the boom, and clear of the reefing lines which, if there is any wind, are likely to flog until the respective reef point is on the deck.

With confirmation from the Skipper the sail can now be lowered, initially slowly as the boom will be coming down onto the kicker, then at a speed that suits the person doing the flaking.

It will be found that as the sail comes down you will need less turns on the winch until in the latter stages all turns can be taken off. **DO NOT BE TEMPTED TO THROW OFF ALL TURNS IN THE EARLY STAGES OF LOWERING THE SAIL.**

When the sail is completely down the person on the mast must thread a dedicated sail tie through the headboard car with the tails going either side of mast and being tied together to hold the sail down. Once this is done the halyard should be tightened to avoid it being entangled with the runners.

Next is to load the topping lift and lower the boom. **Important to check everyone is clear and check with skipper before lowering the boom.** Someone will need to be on the mainsheet again to take in the slack

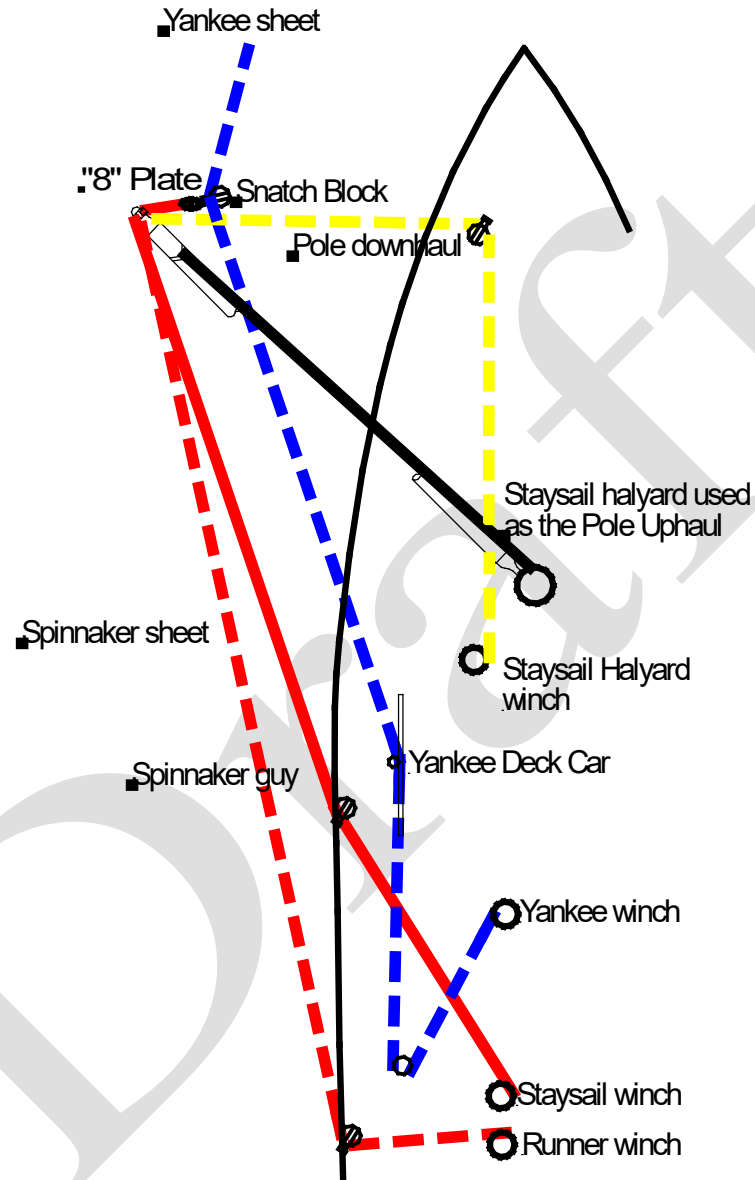
The companion way hatch should be closed and the sail can now be flaked on the boom neatly and secured with sail ties at each batten plus one between forward batten and mast.

The reef lines are pulled through to the snake pit.

If there is time put the sail cover on before lifting the boom whilst the climber is still in the harness.

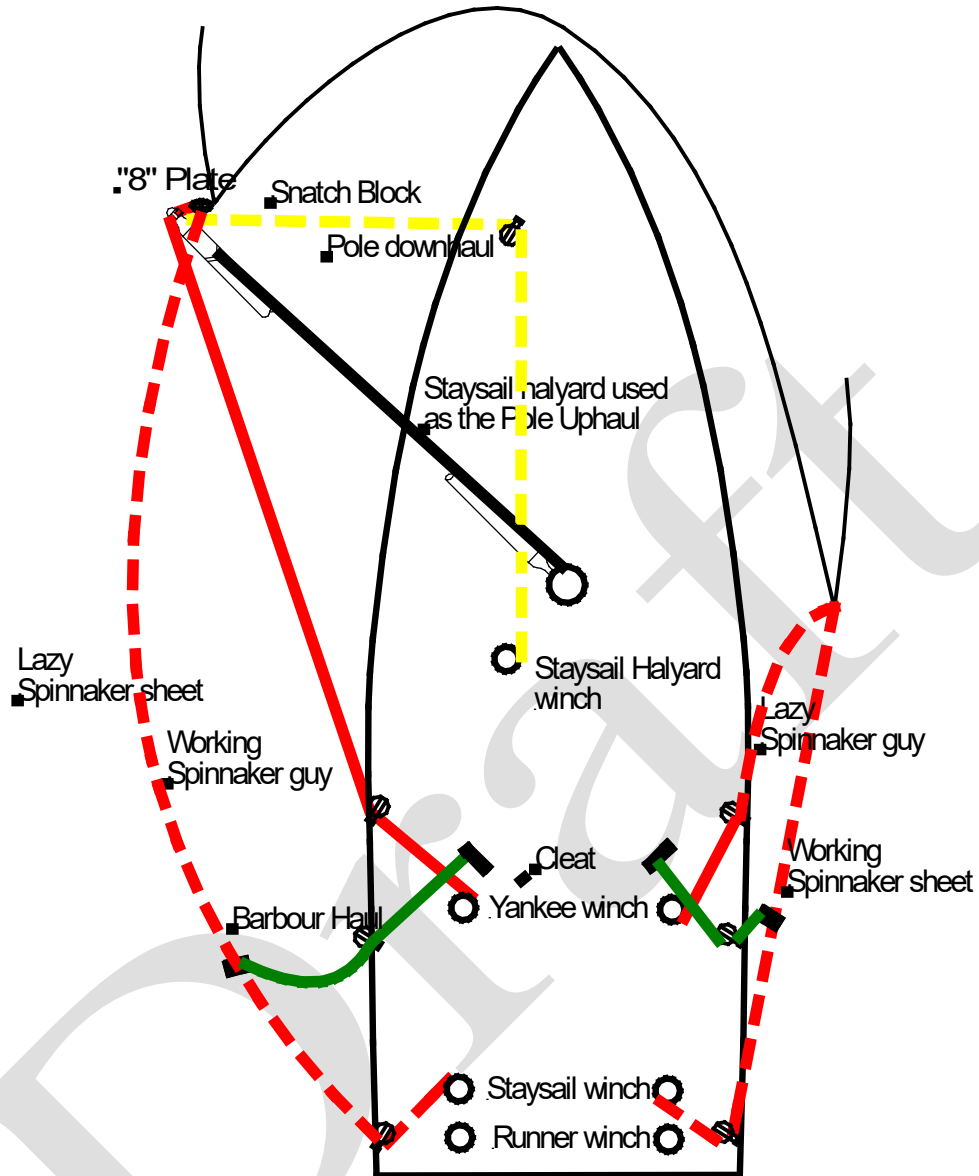
On completion of the stowing of the sail the topping lift should be put on the winch, the main sheet eased off, and the boom raised to its usual height. It is important that no one stands under the boom during this operation until the topping lift is confirmed as being secured in its jammer. Lastly put an overhand slip knot in the topping lift just stern of the jammer to protect crew in case the jammer fails.

14 Spinnaker Pole



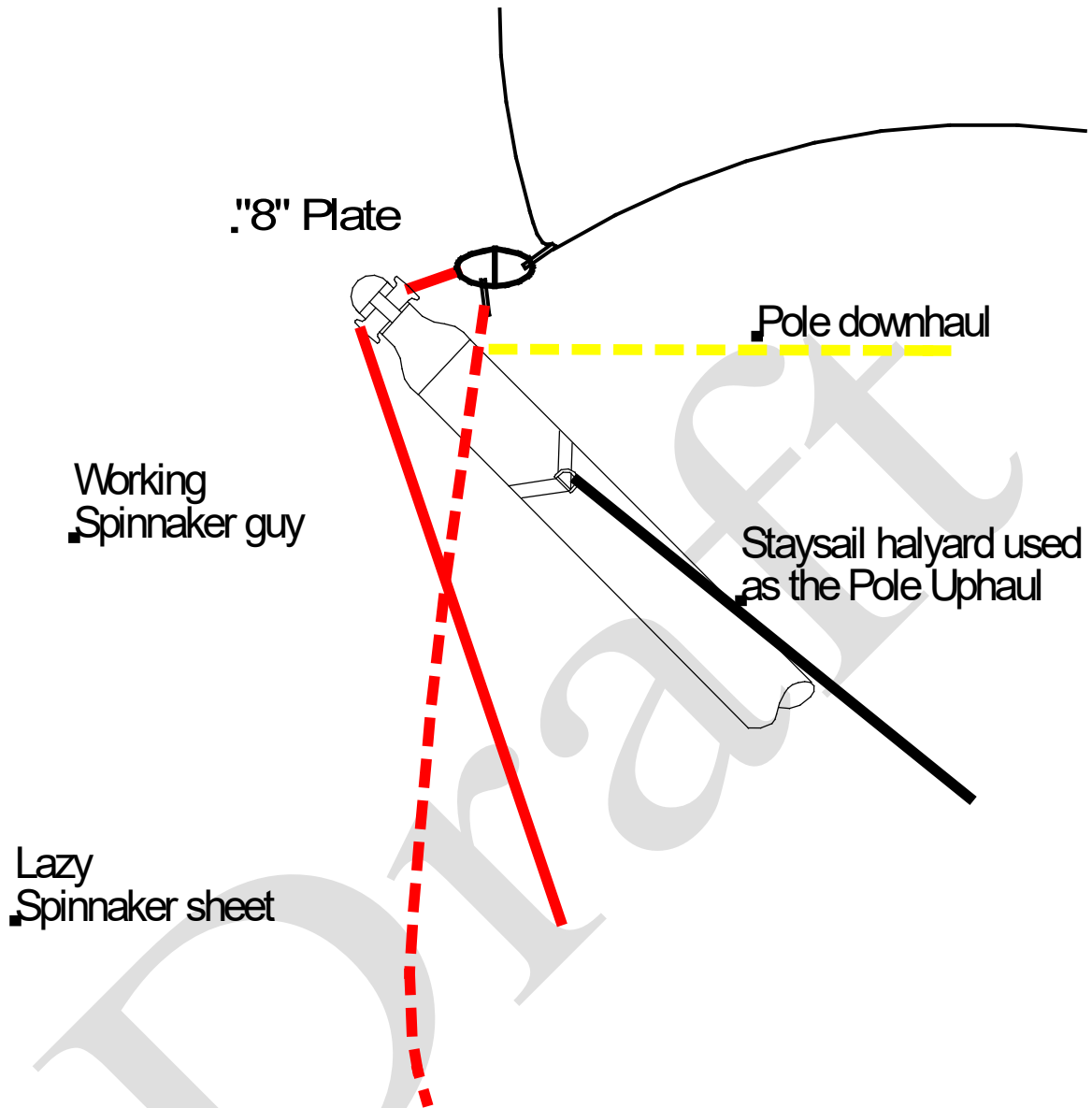
Plan View

Rig of the spinnaker pole for poling out a headsail on port gybe.



Plan View

Rig of spinnaker sheets and guys for spinnaker set port gybe.



Plan View

Rig of spinnaker sheets and guys on the pole end for spinnaker set port gybe

15 Communication

15.1 General

15.2 Hand Signals

Hand signals are very useful, as the foredeck of a yacht can be very noisy in rough weather, it also avoids unnecessary shouting.

Draft



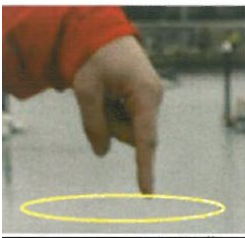
1 finger rotating upwards. Grind in on the foresail (yankee or genoa).



2 fingers rotating upwards. Grind in on the staysail.



Clenched fist. STOP!



1 finger rotating downwards. Ease out on the foresail (yankee or genoa).



2 fingers rotating downwards. Ease out on the staysail.

15.3 Calls

‘READY ABOUT’ – In preparation for tacking or gybing, the safety turns should be removed from winches, the lazy running backstay is brought back and loosely tensioned.

‘HELM TO LEE’ – The helm is turned in the direction of the tack/gybe. Sheets are released from self-tailers and prepare to ease sheets. The back runner is released and the lazy running backstay is tensioned.

‘LEE HO’ – As the sails pass through the wind and the sails start to flap, the sheet should be realised from the winches and transferred to the alternative side.

‘HARDEN UP’ – As the boat gets closer to the wind, either by changing course or change of the wind direction, then the sails need to be brought closer in.

‘BEAR AWAY’ - As the boat goes away from the wind, either by changing course or change of the wind direction, then the sails need to be eased off.

Draft

16 Mast Climbing and Working at Height

Climbing the mast is a potentially hazardous activity that must be fully supervised by the Skipper at all times. The Risk Assessment for mast climbing should be consulted.

Two halyards must be used for mast climbing and the Skipper must ensure that the halyards, fall arrest harness, and climbing harness are correctly fitted. Halyards shall be tied to the harnesses (i.e. not clipped on) and the crew member shall wear a helmet.

While a crew member is working at height the Skipper shall ensure other crew members avoid standing beneath the mast due to the hazard of falling objects. Furthermore, any tools or equipment taken aloft shall be securely attached to the mast climber by means of a lanyard.

When tools or equipment with no suitable lanyard attachment point are to be taken aloft, the lanyard shall be generously taped to the item (such as a can of spray lubricant).

When climbing the mast at sea a safety tether or similar shall be used to assist the climber to contact with the mast and not fly around out of control. Depending on conditions, it may be necessary to rig a guy line to the mast climber which then can be controlled from on deck. This procedure is also applicable to maintenance staff.

When a crew member proceeds to the out-board end of the spinnaker pole (for example to spike the sheet) then a climbing harness and a tied on halyard shall be used. The use of a second safety halyard and the wearing of a helmet shall be at the discretion of the Skipper who shall exhibit good seamanship practice at all times.

It is required that this crew member should have a second attaching point and this can take the form of being clipped onto the down-haul as they climb to the end of the pole.

Whilst a crew member is at the end of the pole the use of the pole up-haul, down-haul and guy lines are prohibited so that the pole does not move.

17 Open Hatch Hazards

When a hatch is opened then the crew member who has opened it must make a general verbal call to the rest of the crew, 'hatch open' to warn others of the event.

When alongside and a hatch is left open, for example, a crew person is working in the area or for ventilation purposes then the area around the open hatch hazard must be roped off and a NO ENTRY sign attached to the rope. No hatch is to be left open and unattended or without the necessary roping off and signage.

18 Mooring

Spring mooring lines are fed from the cockpit winch, through the mid-ship fairleads forward and from the headsail halyard winch in the snakepit, through the mid-ship fairlead to the rear

Fenders are to be attached on rail stanchions as shown

The bow and aft lines are normally run as slip lines attached to the cleat and fed through the forward an aft fairleads

Each line held by crew who position themselves at mid-ships in preparation for alighting.

Make sure you are safe at all times and do not step off the boat unless you are sure of your footing

All remaining crew to sit and allow helm to view mooring

The helmsman will determine in what order the lines are to be fitted

The lines are winched and adjustments made

The bow and stern lines are returned to the boat and a slip line made on the cleats

When necessary, additional mooring lines may be fixed

PICTURE OF MOORING LINES

PICTURE OF FENDER

PICTURE OF SLIP LINE

19 Anchoring

19.1 General

Challenge Wales is equipped with 2 anchors, the main anchor weighing 48 Kgs and a second anchor weighing 34 Kgs, both anchors are of the CQR design. The anchor chain is 12 mm in size and 78 mts long which is stowed in a chain locker forward in the sail locker. The “bitter end” is secured by means of a rope tail which can be accessed through the sail locker sole boards.

The rope tail on the bitter end of the chain is of sufficient length that it will enable the bitter end to reach on deck where it can be cut in the event of having to slip the anchor chain

Additionally, a 100 mt length of 24mm 8 plait nylon rope with a 5 mt length of 12 mm chain, stored under the sail locker grillage, is provided as a kedje warp and tow rope.

An electric windlass is used to raise and lower the anchor controlled by a hand-controller stored near the ladder access to the sail locker.

Main power for the windlass is supplied via an isolation switch positioned on the after end of the central settee in the main saloon. Power for the control circuits comes from the main switchboard, both these need to be switched on to operate the windlass.

When stowed the anchor is secured with the chain stopper and an additional rope lashing around the anchor shank. It should be noted that the anchor which is currently connect to the anchor chain and stowed on deck is the smaller of the two onboard.



Anchor in the stowed position and secured

Anchoring requires good communication between the crew on the foredeck and the helmsman and is normally overseen on the foredeck by the Mate. Communication is an important feature when anchoring and it is important that the Skipper at the helm is informed of the amount of

change that has been deployed at regular intervals and also the direction that the chain is “leading”.

The amount of chain to be deployed will be decided by the Skipper, considerations when deciding the amount or scope of chain will include:-

- on the nature of the bottom
- the depth of water taking into consideration the range of the tide
- the weather forecast
- strength of the current
- quality of the anchorage e.g. lee shore, distance to other hazards.

The markings of the anchor cable are as follows: _

10	1 Blue marker
20	2 Blue markers
30	3 Blue markers
40	1 Red marker
50	2 Red markers
60	3 Red markers
70	1 Yellow marker

It should be noted that the inboard end of the anchor chain is painted red and when deploying the anchor no more chain should be let out once this point is reached.

19.1.1 Preparation

At the navigation station turn on the Windlass control breaker

Set the windlass breaker on the end of the seat in the saloon under which the batteries are located using the special “key”

If the hand controller is to be used bring it on deck through the sail locker hatch. Use a loop of rope across the hatch opening to prevent the hatch closing and damaging the wire

Loose the lashing on the anchor stock.

Open the chain stopper.

Disengage the pawl on the windlass.

19.1.2 Lowering Operations

Flake out 2 metres of chain on deck, note that as there is no weight on the chain at this point so the chain will need to be pulled off the windlass gypsy otherwise it will jam, once there is weight on the chain, caused by the anchor being over the bow roller, then this is not necessary and when the anchor is over the bow no further manhandling should be undertaken.

Carefully lift the anchor over its roller until it is ready to descend and, using the chain on deck, lower it into the water (this avoids the anchor swinging as it is paid out and damaging the bow). Take care during this operation to avoid trapping your fingers. Note that if more than 2 mts of chain has been flaked on deck the combined weight of chain and anchor will be such that it will

be too much to handle and injury may result. When the anchor enters the water inform the helmsman. NOTE; this action should only be done at the command from the Skipper or person in charge of the operation.

Begin paying out chain steadily, again this stage of the operation should only be done at the command from the Skipper or person in charge of the operation. The chain has markers every 10 metres: inform the helmsman of the total chain length in the water.

Pay attention to the lie of the chain relative to the boat and, using hand signals let the helmsman know the “lead” of the chain.

The helmsman will decide when sufficient chain has been paid out. The helmsman may go gently astern to lay the anchor on the sea bed and to dig the anchor in, feedback from the foredeck is important here to prevent dragging the anchor or over running the anchor causing damage to the yacht's topsides.

Once the anchor is set and holding the chain stopper should be applied to take the load off the windlass break.

A chain “snubber” is provided and would be used at the Skipper's discretion.

Take the hand-controller below and close and secure the forward hatch.

Leave the battery isolator in the “On” position but switch off the breaker at the nav station for the control circuits so that the windlass is isolated but available with minimum effort.

By day raise the anchor ball and at night set the anchor light

Make an entry in the Ship's Log, including the length of chain let out.

19.1.3 Use and Rigging of the Anchor Snubber

The anchor snubber consists of a chain hook and a length of 22mm 8 plait nylon rope. The benefit of using the snubber is that it can reduce the snatching that maybe experienced in certain conditions and will protect the hull of the boat in the event of the boat over riding the anchor and chain during the change of the tide direction or when the wind and tide oppose each other.

To rig the chain snubber it necessary to flake the rope on the deck to ensure it will pay out without tangling or snagging.

The chain hook is then attached to the anchor chain out board of the bow roller. Once this is done it is necessary to keep tension on the line to prevent the hook becoming detached from the chain. This can be done by taking a turn of the line on a mooring cleat.

Next the anchor chain is paid out slowly and the line eased. Co-ordination is needed here as there has to be sufficient load on the anchor chain to enable it to be paid out but also sufficient weight to be kept on the snubber line to prevent the hook from becoming detached from the chain.

The amount that is paid out would normally be so that the chain hook would be just in the water.

The occasion has arisen whereby the 78 metres of anchor chain has not been sufficient for secure anchoring. Such an occasion was when undertaking a Mediterranean moor in a Norwegian Fiord.

In these circumstances it is necessary to bring on deck the anchor warp and flake it up and down the deck in a similar manner to the snubber line would be flaked. The chain hook needs to be removed from the snubber and attached to the anchor warp.

The anchor would be deployed and paid out as for normal anchoring until the red painted cable marking the bitter end appears on deck. At this point the chain hook is attached to the anchor chain out board of the bow roller as previously described. Pay out of the chain can then continue until the bitter end of the chain is on deck, at this point the bitter end shackle is detached from the bitter end pennant and shackled around the anchor warp.

This action has two benefits, firstly it provides a chain “tail” which will facilitate recovery of the anchor later and secondly it provides security in the event of the chain hook failing the anchor and chain is not lost as the bitter end shackle will slide down the anchor warp until it reaches the spliced eye of the anchor warp and no further.

Next action is to transfer the anchor warp from the mooring cleat to the windlass drum using a suitable rope stopper ensuring that tension is kept on the warp preventing the hook from slipping off the chain.

The warp can now be paid out, with care as the chain is deployed over the bow roller, until the required scope is set.

WARNING; There is potential for there to be heavy loads experienced on the warp due to the catenary of chain that may be suspended from it, with this in mind an experienced person should be allocated to this task and it is important that they keep the lead onto the windlass drum low to prevent turns “jumping” of the drum.

Once the required scope of cable is deployed then the anchor warp should be transferred to a mooring cleat, using the rope stopper, and secured.

Recovery of the anchor is the reverse of the above procedure.

19.2 Anchor Watch

At all times that the yacht is at anchor a minimum of 2 crew will remain with the boat in case it is necessary to get underway or to deal with any situations on board that may occur.

While anchored a regular watch must be kept by day and night in case the anchor should drag or the boat be at risk of collision with another anchored vessel which has dragged its anchor.

Regular all-round checks should be made during the day, observing transits to determine drift and checking other vessels.

At night the skipper will set an alarm radius around the boats current position on the plotter and crew will be allocated watch-hours during the night to monitor the plotter marker as well as regular trips on deck to check position and relative positions of other vessels.

19.3 Weighing Anchor

19.3.1 Preparation

Set the windlass control breaker at the nav station switch panel.

Bring the hand-controller on deck.

Set up the deck-wash pump equipment and have a brush handy to scrub off any mud on the anchor chain as it is raised.

19.3.2 Operation

All operations are under the control of the helmsman who relies on the foredeck crew to keep him or her informed of the status of the chain and the boat's head relative to it. The helmsman will order the anchor to begin to be raised.

Using the windlass controller begin hauling in chain. As each marker appears call out how much chain is left in the water. Wash off any mud on the chain before it enters the chain locker

Observe how the boat's head lies relative to the run of the chain and use hand signals to inform the helmsman. When the chain is "up and down" inform the helmsman. Also inform the helmsman when the anchor is clear of the water.

Carefully bring the anchor over the roller: this is best done in a single move rather than short raises to avoid the anchor swinging and hitting the bow.

Remove the battery box breaker key and switch off the windlass breaker on the panel.

Take down the anchor ball or anchor light.

Fit the chain-clip and lash the stock as shown in the picture in Section 23.1.

Make an entry in the Ship's Log.

20 Tender Launching and Recovery

20.1 General Description

Challenge Wales is fitted with a pair of Simpsons davits each rated at 250kg, they are electric in operation and protected electrically by a “trip” behind the main switch board.

The tender is a 6 person Zodiac with an inflatable keel and is provided with a Yamaha 15 hp engine.

The tender is normally stowed without the engine attached, there are two reasons for this, firstly the engine will foul the davit stopping the tender from being fully hoisted and secondly the davit is likely to be overloaded when dynamic forces are applied when underway.

The tender is secured, when stowed, by two “gripes” in the form of ratchet straps.

The “falls” are connected to strops in the tender, the forward strop is attached to the floorboards only so it is important that the tender is fully inflated before the load is taken on the fall.

There are two strops in the stern and they are attached to the transom. Under normal circumstances shorter strop is used as this will enable the boat to be lifted the full height as mentioned above, the longer strop is used if the tender is to be lifted from the water with the engine still attached.

It should be noted that the tender is always stowed bow to port because of the way the cover is cut..

20.2 Launching

After removing the cover the chambers of the boat should be checked for pressure before the gripes are released. **It should be noted that no one should get into the boat after the gripes are released** because of the way the forward fall is attached as mentioned above and the davits are not rated for man riding.

If not already attached the painter should be secured, normally to the guard rail.

If the breaker has been tripped to isolate the davits then this should be re-established, it is located in bottom DC link box behind the panel at the navigation station.

Once the gripes have been released the boat can be lowered to the water. Once the boat is waterborne a small amount of load should be maintained on the falls to keep the boat close to the transom of Challenge to allow safe access by a crew member.

It is important that at no time are the falls to be lowered with no load on them, during the unhooking process the crew member in the boat should maintain tension on the falls wire, this will avoid any slack wire on the winch drum in the davit with the potential of wire failure.

21 Navigation Station

21.1 General Description

The navigation station is centered on two PC's, PC 1 is the main computer and PC 2 is the back-up. PC 1 is used for general computing, internet access, Admiralty publications, planned maintenance records etc. PC 2 is used for navigation purposes as well as back up for the Admiralty publications as required.

The Admiralty publications should be updated on a regular basis, this is easily done when the units are connected to the internet and a prompt to update will appear regularly when either of the publications is open.

Similarly PC 1 is provided with the same charting system as PC 2 so it can be used as a back up for PC 2 should a failure occur with it. For this reason PC 1 receives its GPS information independently direct from the Leica MX400 and is not connected to the multiplexor which provides NMEA data for PC 2.

Both computers are independent of each other with the only common point being they are powered from the same 110 volt inverter. In the event of a failure of the 110 inverter the PC's can be powered from the 240 volt inverter by unplugging the input lead to the respective transformer (located behind the main panel on top of the Sat C unit) and replace it with the "kettle lead" stored on the bottom shelf of the cabinet where the safe is, and plugging it into the 13 amp socket.

The plotter operating system used on both PC's is Digital Yachts Smart Track which in turn uses Navionics charting system. Cards covering the whole of Western Europe, including the Baltic are available although not necessarily updated due to the fact several years may pass between sailing in these areas.

The respective cards are loaded onto the computer's hard drive freeing the cards for use elsewhere.

21.2 PC 1

As mentioned above this PC is set up for general computing but can also be used as a plotter for back up purposes.

Internet connection to this PC is provided by 1 of 3 ways as appropriate at the time;-

- I. Using the Digital Yachts WL510 Wifi system.
- II. Through the Inmarsat system.
- III. Direct link to the PC Wifi from a mobile phone.

The Inmarsat system is extremely expensive and should only be used for specific tasks and not general internet searching. Ensure that the PC is not set for automatic downloads.

PC 1 is also used for the Planned Maintenance System, this is based on an excel spreadsheet with hyperlinks to various other documentation and should be backed up to the office on a regular basis.

The PC is connected by HDMI cable to the TV in the saloon so it can be used for demonstration/teaching purposes.

PC 1 audio output is connected to the stereo system and a library of music is available.

PC 1 is provided with a printer located in the cabinet in the saloon, the printer has little use and experience has shown that the ink dries up rather than gets used up.

21.3 PC 2

This is the main navigation PC and as such is provided with multiple NMEA inputs via a multiplexer which is located behind the monitor of PC 1. The multiplexer is powered by the same breaker as the B & G instruments.

NMEA data provided includes the B & G instrumentation, AIS (including Primary GPS), Fluxgate Compass (including Secondary GPS). It should be noted that in the event of a failure of the AIS system the PC will automatically switch its GPS input to the Fluxgate with no loss of position on the plotter.

This computer is not connected to either the WL510 Wifi or the Inmarsat system, the only way to connect to the internet is by its own internal Wifi system and under normal circumstances this would only be for the update of the Admiralty publications.

22 Communication Systems including DSC

There are multiple communications systems available on Challenge, not all are available without prior action. These are :-

- I. Main VHF unit
- II. Helm VHF unit
- III. SSB Radio
- IV. Satcom C
- V. Iridium Sat phone
- VI. Inmarsat phone

Main VHF

This unit is located at the nav station, the main aerial for this is at the top of the mast. A back up aerial for this unit is located on the aerial gantry aft, this would need to be connected to the VHF in the event of main aerial failure (loss of rig). To connect the aerial remove the monitor for PC 1, you will find the cable for the back up laying loose simply disconnect the aerial from the VHF unit, also located behind PC 1 monitor, and connect the back up.

The requirement to have this spare aerial is now technically superseded by the fact that an additional VHF with its aerial also mounted on the aerial gantry has been installed at the helm position.

The DSC provision on this VHF is not a function of the VHF itself, the VHF is connected to a DSC controller via a unit under the seat at the nav station, because of this there is no GPS provision on the VHF.

Helm VHF

The helm VHF is a relatively new addition to the boat and is powered from the “ready use” breaker which bypasses the main switch panel. The aerial for this unit is on the aerial gantry aft so its range is limited compared to the main VHF.

This VHF does have its own DSC facility and is programmed with Challenges MMSI.

SSB Single Side Band

The SSB radio is rarely used and any operator of this should be appropriately certificated. It is connected to the DSC controller via the same unit as the VHF located under the seat at the nav station.

Even when just on receive mode it is a significant drain on the batteries and therefore normally only switched on when traffic is expected.

Satcom C

This unit is effectively redundant, it requires an account being set up with a shore side provider which is no longer in place, in the past we used Applied Satellite Technology (AST). It also requires software to be put on PC 1 and connection to it.

Iridium

The Iridium unit is located back aft at the old Video station with the handset being in the main saloon. This unit is also rarely used and requires a SIM card which we have provided when undertaking TSR.

It is currently only a telephone although it could be connected to the PC for data.

Inmarsat

This is a very useful bit of kit but extremely expensive to use. It provides both telephone and internet access but must be used with caution due to the cost. For this reason the PC needs to be connected via a “C” prompt on the desk top and this should be returned to Wifi by another “C” prompt to avoid any unintended data transfer.

The handset for the Inmarsat is located in the main saloon next to the Iridium phone.

Instead of requiring a SIM card the Inmarsat requires credit being in place prior to operation.

Draft

DSC (Digital Selective Calling)

To meet the DSC requirements and due to the fact there are two means of radio communications i.e. VHF and SSB the boat was originally fitted with a DSC controller module the control panel of which is located at the nav station. The module itself is located under the nav station seat.

The module has 2 aerial inputs, one being VHF which is mounted on the aerial gantry and the other for the SSB is the shorter of the 2 whip aerials mounted aft of the helm position.

GPS data is fed to the system from the Leica MX400.

23 Mooring

24 Pilotage

24.1 The Barrage Locks

24.1.1 Introduction

The barrage locks are a significant consideration when operating Challenge Wales out of Penarth. Challenge is the deepest draft vessel that is based here and heed must be placed when transiting the lock system. The need to understand their operational criteria from not only the boat operators point of view but also from the Harbour Authority's is essential.

Historically a good relationship has been established between the Charity and the Harbour Authority where regular communication between the two parties has worked to the benefit of all.

24.1.2 Bay Levels

Water levels in the Bay are referenced to Ordnance Datum, and will generally be given as a height above this datum – AOD. Levels may vary between 4.0m and 7.5m AOD although these are extreme and the range is generally between 4.2m and 4.8m with the norm being 4.55m during the winter and 4.7m in the summer. The level at any given time may be obtained from Barrage Control.

Several criteria dictate the level of the bay at any one time the main ones being:-

- the amount of rainfall being experienced and forecast
- salinity of the water
- flood prevention

The amount of rain and therefore river flows is fairly self-explanatory and has the following impact:-

- if there is no rain then the bay will progressively lose water through the locking process, evaporation, the requirement to keep water running through the fish pass, and also leakage. This has become more of a problem recently with the hotter, dryer summers we have been having. Lock restrictions will be put in place during such periods and levels could make operations for Challenge impossible. Careful monitoring and liaising with the barrage control is essential during such periods to avoid the boat getting trapped inside.
- the salinity of the bay water is critical in the eyes of the environmental agency, therefore, during periods when the height of tide is greater than that of the bay the 5 sluices will be closed to prevent sea water ingress, this is known as “tide lock”. The result of this is that the bay level will progressively increase to the extent that if river flows are high then there is a risk of flooding. To get around this the barrage control will lower the level of the bay prior to tide lock, the amount they lower it will depend on river flows both actual and predicted. This reduction of bay level potentially effect Challenge operations and needs to be monitored by communicating with the barrage and checking on the Harbour Authorities system.

24.1.3 The Locks

All 3 locks are 40 m long, locks 2 and 3 are 8m wide and number 1 is 10.5m. Locks 2 and 3 are also the same with regards to inner and outer sill height. The outer sills of 2 and 3 are -0.7m on Chart Datum.

NOTE the change to Chart Datum for the outer sill from Ordinance Datum for the inner sill.

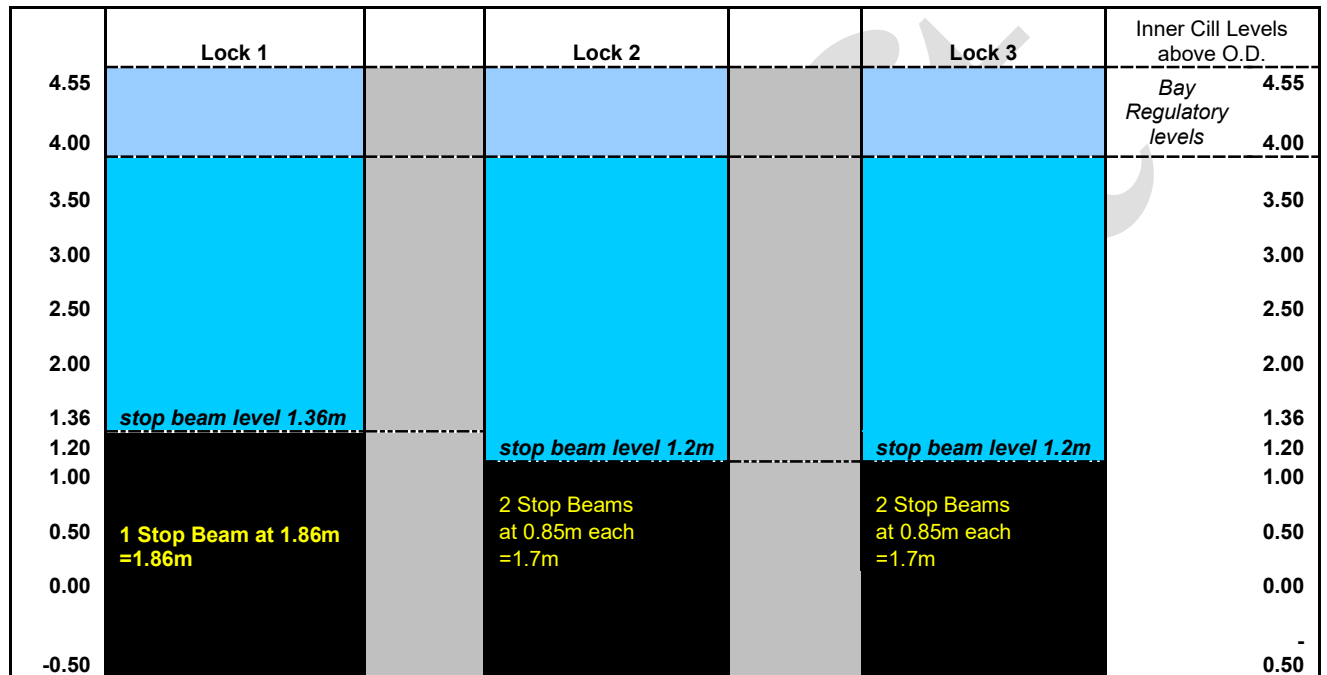
All three locks have restrictions on the inner sills by way of stop beams which has the effect of reducing the clearance over the sill, under normal circumstances this restriction means that Lock number 1 is not useable for Challenge Wales unless the bay level is higher than 4.7m and lock 2 and 3 should only be used if the bay level is 4.55m or greater.

ANY REQUEST BY BARRAGE CONTROL TO USE LOCK 1 SHOULD IMMEDIAMETLY BE CHALLENGED.

DEPTH OF WATER OVER THE INNER LOCK CILLS & STOP BEAMS - January 2020

Bay Level	Lock 1	Lock 2	Lock 3
4.55 m	3.19	3.35	3.35
4.5 m	3.14	3.3	3.3
4.4 m	3.04	3.2	3.2
4.3 m	2.94	3.1	3.1
4.2 m	2.84	3	3
4.1 m	2.74	2.9	2.9
4 m	2.64	2.8	2.8

INNER CILL AND STOP BEAM LEVELS - January 2020



LOCK INFORMATION

LOA (Gate to Gate)	44.5m	Lock 1 Outer Cill Height	-4.0 m O.D. 2.3 m C.D.
Pontoon Length	31.5m	Locks 2 & 3 Outer Cill Heights	-7.0m O.D. -0.7m O.D.
Lock 1 Entrance Width	10.5m		
Lock Width 1,2 and 3 (pontoon - pontoon)	10.5m		
Lock 2 & 3 Entrance Width	8.0m		

24.2 Padstow

24.3 Portishead

24.4 Swansea

24.5

24.6

Draft