

DECEMBER 2012 EDITION

## BENJAMIN WALTERS OFF SHORE OPERATION MANUAL



2012 ON WAY TO DRAKES BAY

**REGARDING SAILORS...THE REASON  
THAT SO MANY SAILORS ALIVE ARE  
CAREFUL IS THE ONES WHO WEREN'T  
AREN'T ALIVE—**

## **INTRODUCTION:**

*This manual supplements the basic manual prepared for use of the vessel in protected waters such as San Francisco Bay. It is assumed that the vessel will be coastal cruising or passage making with one to eight persons in the crew. It is further assumed that the reader has already become familiar with the basic operations manual of the vessel.*

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*December 2012*

## TABLE OF CONTENTS

1. Autohelm	Page 4
2. Amp. Hour Meter; Inverter, Etc.	Page 6
3. The Propane System for Cooking	Page 12
4. Anchoring the Vessel	Page 15
5. The Electronic Overboard Alarm System	Page 19
6. Harnesses and Jack Lines	Page 20
7. Overboard Procedure and Equipment	Page 21
8. Refrigeration	Page 24
9. Water Tanks; Water Maker; Showers	Page 25
10. Head and Holding Tank	Page 28
11. Single Sideband Radio (SSB) and Satellite Phone	Page 29
12. Weatherfax	Page 30
13. Misc. Cruising Electronics	Page 31
14. Dinghy; Davits; Outboard	Page 32
15. Storm Gear/Actions	Page 34
16. Emergency Gear: Procedure	Page 41
17. Manual Backup Systems	Page 48



## 1. AUTOHELM

This ROBERTSON unit provides automatic steering on a preprogrammed electronic compass course. Once set, it will stay on that course so long as the boat has any forward movement. It does utilize significant power, especially in a seaway, but as a practical matter is usually on for most cruising. It allows one person to easily perform a full watch since he or she is not confined to the wheel. In bad weather it is even more valuable, with the helmsman able to sit under the dodger or even at the navigation station below rather than behind the wheel and exposed to the elements.

The AUTOHELM is operated utilizing one circuit breaker on the DC board outboard of the navigation station. The control panel for the unit is in the cockpit, to port of the helm seat, and has a power button on it as well. The manual for the unit is in a folder in the lower locker forward of the navigation table and should be referred to for basic operations of the unit.

The unit has a memory so that if regular patterns of waves occur which push the vessel off course but for which the vessel's sails will correct after the waves pass (e.g. the vessel wallows but continues on an average correct course) the unit will stop correcting after a while so that the vessel will simply go back to its course without the need for the AUTOHELM to utilize power.

Ignore the compass readout on the unit itself and use the more accurate binnacle compass to determine course. The buttons on the control unit move the heading one degree for each push to port or starboard depending on the button pushed.

### A. The CONTROL UNIT

To port of the helm seat is the control unit which turns the unit on and off, adjusts the course, and warns via a beep if the vessel is off course. The readout on the unit indicates if it is engaged or on standby. The buttons marked plus or minus one or ten refer to degrees on the compass rose (e.g. plus ten means add ten degrees to your course, thus 225 degrees would become 235 degrees...) The more to starboard you wish to go, the more plus numbers you should push. The more port you wish to go, the more minus numbers you should push. You can push the numbers several times for a major course change...e.g. push six times for a 60 degree alteration in course. If you hold the button down for about five seconds, it automatically moves in the direction indicated by units of ten degrees each second for so long as you hold the button in.

The unit has an "off course" alarm, a high beep emanating from the control unit to port of the helm seat. This will occur if wind or engine does not give sufficient thrust to allow the vessel to be steered or if wave conditions are such that the AUTOHELM cannot recover its preset course. When such an alarm sounds, turn off the unit and reset after you have adjusted course.

The light for the control unit is turned on by pushing the right button several times. The brain for the unit is mounted below in the hanging locker (aft end) of the port rear berth. The thrust arm is attached to the rudder post, of course, and is accessed via the aft end of the port rear berth.

**THE AUTOHELM IS STUPID...IT WILL HAPPILY STEER THE BOAT INTO ANYTHING ON ITS SET COMPASS COURSE, BE IT BOAT OR ROCK. IT IS, IN THAT RESPECT, VERY DANGEROUS IF THE HELMSPERSON IS SLEEPY OR LAZY. IT STEERS THE BOAT. THE WATCHPERSON IS STILL REQUIRED TO KEEP WATCH.**

There is a tendency in bad weather to doze off or spend all your time below. While being below is one of the reasons for the AUTOHELM, be sure to keep the radar on and check the horizon constantly, at least once every five minutes. Remember that a freighter moving along at fifteen knots will move from the visibility to collision distance, in poor weather or high waves, in less than ten minutes. YOU ARE ON WATCH, NOT THE AUTOHELM.

There is another auto helm remote control unit by which the course may be altered once the unit is on, at the navigation station to starboard of the navigation table. By using this control unit, one may alter course without having to go into the cockpit, a useful tool when weather is foul or if adjusting course based on the radar. AGAIN, DO NOT ONLY RELY ON ELECTRONICS FOR AVOIDING PERILS...GO ON DECK AND MAKE A VISUAL CHECK AS WELL.

Due to the placement of the autohelm control unit near the helm seat, a person standing near the helm seat leaning backwards can accidentally turn the autohelm on or off. If that is the case, simply push the buttons again to reset and in tight locales, make sure no one stands near that position port of the helm seat.

### B. OPERATIONAL DETAILS

The unit will not work well in a large following sea since it cannot anticipate waves, merely react to the effect they have on the compass bearing after they have passed...whenever anticipation

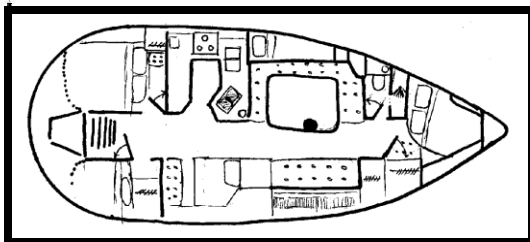
is needed for the vessel, you must manually assume control or, at the very least, stand by the unit to take over. Momentum can force the vessel so far off course that the sails begin to backwind or even gibe before the unit can react and reassert control.

When first turning the unit on, you must make fine adjustment, pushing the plus or minus keys, until the vessel is adequately balanced. Main and Jib are the best combination for the vessel to balance, staysail alone the worst. Very light winds and unpredictable seas will make the unit either often off course or use a great deal of power.

The helm has a **wheel lock** and if the winds and seas are steady, especially when going to windward, the balanced vessel can hold its course without the need for AUTOHELM, thus saving power. Nevertheless, the wheel lock must be supervised and it is unwise to leave the locked helm for more than a few minutes. The wheel lock is the round disc on the starboard side of the binnacle...turn the disc with the wheel in the correct position and the wheel will lock. REMEMBER TO DISENGAGE THE WHEEL LOCK BEFORE ENGAGING THE AUTOHELM.

The actual compass for the AUTOHELM is located in steering compartment directly below the helm seat. Access is achieved through the doors at the aft end of the two rear berths. Rather than correct the compass, simply use the binnacle as your compass and ignore the readout on the control unit.

The unit uses much more energy in choppy seas as it needs to constantly adjust its course. In rough weather, it can drain the batteries after ten hours, thus be sure to monitor the amp hour meter closely if relying on the AUTOHELM a great deal.



**2. AMP. HOUR METER; INVERTER, ETC.**

### **A. CONSERVING ENERGY**

The electrical system of Benjamin Walters is extensive and complex. Due to the large number of electrical instruments, it is critical on any substantial cruise to both preserve energy and recharge the batteries. This, in turn, requires careful and continuous monitoring of the use of the electricity and timing of the recharging.

The AUTOHELM, refrigeration, navigation instruments, bilge and water pumps as well as use of the inverter and water maker constitute the largest relatively quick drain of power, but it is the lights below and the navigation lights which, over time, use the most and drain the battery the most due to the continuous long term use. Quick drains of the battery do not actually exhaust the batteries as completely as slower continuous drains.

The best way to conserve power is to minimize use of the inverter and the DC lights below. The LED lights use the least juice and almost all lights on board as well as the navigation lights are now LEDs as is the spreader light. The shaded 12 volt bulbs (the various DC lamps with shades) use LEDs.

The refrigerator is a 12 V cold plate, as discussed in its relevant section, and does use DC power. Thus conservation of cold in the refrigerator is achieved by seldom using the lower door (cold air "falls" out) and by closing the top door quickly to cut down on energy loss. The refrigerator is well insulated for the purpose of maintaining cold temperature with the least loss of energy.

Lastly, the inverter is always an inefficient drain on energy since DC is converted to AC and AC appliances are not designed to save on energy. As such, the microwave, the coffee electric drip, and the computer, television and VCR or DVD are significant drains, all using the AC power thus the inverter. They should be used, of course, but keep in mind that their use will require hours of recharging the battery.

A cruiser put it quite well: nothing is free. You have a reservoir of energy called electricity in your batteries. You drain it, fast or slow, and must refill the reservoir by engine power via the alternator. Whenever you take a "drink" of electricity, remember that we must replenish by a noisy and fuel-using engine.

## **B. THE AMP. HOUR METER and QUAD CYCLE**

The unit which continuously measures use of electricity as well as giving you a total number of amp hours used to date is the **Amp Hour meter**, which, together with the **Quad Cycle** measures and controls drain and charging of batteries. The Amp Hour Meter unit is located directly behind and above the navigation seat and is wired into both the gel cell batteries ("**house batteries**") which are a set of three six volt deep cycle batteries and the single 12 volt gel cell starter battery ("**starter battery**") whose sole use is to start the engine. The Quad Cycle Unit readout is on the unit and by use of pushing buttons gives you voltage of the two battery banks (starter is the first voltage read out, house batteries the second voltage readout) as well as remaining Amp hours still in the batteries and current use of amperage. It will also show CC when shore power is charging.

It is important to note that house batteries are the second read out of voltage, starter battery the first. The starter battery should not be reduced in voltage unless you are paralleling them due to emergency and unless you are starting the boat. It is isolated for the sole purpose of starting the engine.

Note that the amp hour use measures net loss of amperage, thus if the engine is on it will normally show charging..e.g. a gain of amperage. The same is true when shore power is plugged in. Note that the Quad cycle automatically adjusts the charge being received by any source, thus the alternator will charge slower and slower as the voltage increases, beginning at over ninety amp hours per hour and slowly reducing to perhaps forty amp hours per hour as the charge increases.

One can expect the engine, at 2800 RPMs, to begin recharge of a depleted battery at 90 amp hours per hour and slowly reduce to perhaps 20 amp hours within an hour. Shore power normally begins charging at 40 amp hours per hour and, again, shows CC for charge. Note that no charge will occur unless the charge button has been pushed...and a green LED will light up on the charge button if a charge is being received.

The purpose of the Quad Cycle goes far beyond information, for the unit allocates both where the charge is going and reduces or increases the charge predicated on voltage in the battery and condition of the battery. The "eliminator" unit allocates charge between the starter battery (which is normally high in voltage) and the house batteries, which are often used to the point of lower voltage. Such allocation between the two banks prevents "cooking" the batteries and one can note that the Quad cycle adjusts the charging rate automatically so that the rate of charge decreases as the batteries fill up and the starter battery receives only a small trickle charge even as the house batteries receive a much larger charge. This is an automatic process which need not be adjusted aside from "conditioning" the batteries once a year or so.

Battery charge comes from shore power, alternator and, if attached, any solar panels or the wind generator. As of this writing, the wind generator and solar panels have been removed from the vessel.

Next to the Quad Cycle is the Amp hour meter which shows net use of Amps. **The total amp hours available to be drained from full house batteries is about 250 amp hours. Beyond that, while there is juice, the voltage begins to sink to the level where performance of electronics will be affected. Begin to recharge when the amp hour meter shows a minus 200 hours or sooner. The ideal time to recharge is between minus 100 hours to 200 hours since it is more efficient to recharge a partially discharged battery than a very low battery. Note that normally the house battery is isolated from the drain on the house batteries as described in this manual, so even if an error is made and the house batteries are fully drained, one can normally still start the engine with the unaffected starter batteries. There is also an emergency starter battery next to the boat batteries, as described elsewhere in this manual.**

Note that when you are running the engine to charge the batteries you are also heating the water since the engine has a **heat exchanger** which will heat the hot water tank. It is therefore useful if one is planning to wash or shower to shower after about a quarter hour of running the engine and have the second or third shower each quarter hour thereafter.)

**Shore power** will charge the batteries at the rate of about 40 amps per hour (slower than the engine). However, whenever one can, link up to Shore power rather than use the alternator on the engine to save fuel. The Amp hour meter and the Quad cycle will show *net* charge from either the engine or the Shore power. (Recall that it also has one position where it shows *gross* charge from the alternator but not gross but only net amp charge from shore power.)

The engine should charge the battery at over 90 gross amps per hour assuming the batteries are discharged by 60 amp hours or more. As the batteries charge, the amperage from the alternator will be automatically reduced by the Quad cycle, slowly lowering to perhaps forty amps as the batteries charge. If they lower too fast (e.g. at minus 80 amps hours are charging at



only twenty amps) you can increase the time for massive charging by turning the adjustment screw on the panel for the **regulator** which is located in the salon on the forward shelf above the engine. Pull the aft salon seat forward to get access to the engine compartment. On the forward end you will find the regulator attached to the shelf above the engine, the unit with small LEDs. Using jeweler's screwdriver, which you will find above the navigation table on the hand rail, adjust the tiny screw labeled "time." The unit itself tells you which way to turn the screw. Careful how much you turn since you can "cook" the batteries with too high voltage if you go too far. There is also a **voltage meter** in the forward cabin, starboard under the switch for the windless which shows degree of voltage in the house batteries and will also show when charging is occurring.

On the main DC circuit board you also have both **a voltage meter and amp meters** for both DC and AC which can be used to verify or instead of the Amp Hour meter though degree of usage over time is not indicated merely remaining voltage. Remember that a 12 volt battery is fully charged at 13-14 volts; half discharged at 11 volts; fully discharged at 10 volts.

The AC panel under the stair also has an AC voltage and amp meters for the port side AC. Lastly, the inverter panel shows on red LED scale voltage and amp use of the DC house batteries.

### **C. THE BATTERIES**

The correct position of the **battery switches** located in the port rear berth at the foot of the berth is discussed in detail in the basic manual and reference is made to that section. Normally, the battery banks are isolated from each other to preserve full charge for the starter battery. The standard positions are marked with red tape. THE BATTERY SWITCHES SHOULD NEVER BE MOVED WHEN THE ENGINE IS ON AND ONLY ALTERED BASED ON EVENTS DESCRIBED BELOW. IF THE BATTERIES ARE TURNED OFF WHEN THE ENGINE IS ON, IT CAUSES A SURGE THROUGH THE ELECTRICAL SYSTEM WHICH CAN DESTROY THE ELECTRONICS.

The batteries are all located under the port rear berth and are comprised of three closed cell six volt batteries (the house batteries bank) and one closed cell twelve volt battery (the starter battery bank.) No water is ever needed to be added to any of the batteries.

There are two independent battery banks, the house batteries, which are six volt batteries wired in parallel to equal twelve volts, and the gel cell starter battery. The house gel cells are deep cycle batteries capable of holding tremendous amperage but not of creating a quick surge of power needed to start an engine. They should only be used to start in emergency situations.

The starter battery is normally separated from the gel cells so that it stays fully charged and ready to start the engine. In the basic manual is described the method to utilize both gel cells and starter batteries, together, to start the engine should the starter battery voltage become low for any reason.

**EVEN IF THE HOUSE BATTERIES ARE COMPLETELY DISCHARGED BY MISTAKE, THE STARTER BATTERY SHOULD NOT BE AFFECTED IF THE POSITION OF THE SWITCHES IS LEFT AT THE MARKED RED TAPE ON THE SWITCHES.**

**USING THE SWITCHES, KEEP THE STARTER BATTERY ISOLATED FROM THE HOUSE BATTERIES AT ALL TIMES SO AS TO PRESERVE THE ABILITY TO START THE ENGINE.**

**NEVER USE THE STARTER BATTERY TO HELP THE HOUSE BATTERIES...INSTEAD, **START THE ENGINE AND CHARGE UP THE HOUSE BATTERIES.** THE STARTER BATTERY SHOULD ONLY BE USED FOR THE ENGINE.**

*On the other hand, if for some reason the starter battery is too low to start, one can use the house batteries to help it start the engine. You simply turn all the switches to "both." There is a good chance, after use of the glow plug, that this will start the engine and begin charging all the batteries. Remember, do not turn the battery switches back to normal position with the engine on...wait until the starter battery is charged, then turn off the engine and place the battery switches back into their usual positions.*

If an error is made and all the batteries are "dead," recall that if left off for an hour or two they often will regain some of their charge, perhaps enough to start the engine. Parallel the gel cells as described in the basic manual, turn off all electrics of any kind, wait an hour, use the preheat as described on starting the engine, and try again.

**In the battery compartment, outboard, is an emergency self contained battery which can be used to start the dead batteries. Instructions are on the unit. Attach its leads directly to the starter battery cables just as you would start a car battery using leads from another car.**

If the engine still will not start, save the remaining battery power to run the VHF, etc. and, if no wind generator is available to charge the batteries, either call for help or plan on sailing to your destination without the engine. Recall Vessel Assist will come to start your engine and you can reach them on Channel 16 or by calling them on the number that's on the key chain on the engine. Recall that even if no battery power for the VHF at the navigation station, there are two handheld VHF's on board and also cell phones or the satellite phone can be used to call Vessel Assist. **DO NOT CALL THE COAST GUARD UNLESS LIFE OR VESSEL IN IMMEDIATE DANGER.** If such danger exists, use VHF Channel 16 and call Mayday.

#### **D. THE INVERTER**

The vessel is equipped with the **Hart inverter/battery charger** which is a combination shore power-battery charger and inverter.

When shore power is plugged in the shore power will automatically begin to charge the batteries with the Quad Cycle described above automatically adjusting the charge to the level of the batteries. The Quad Cycle read out should show a net positive flow of amperage to the batteries.

The Amp Hour meter should begin to decline in hours used. It will take about five minutes after plugging in for the Shore power unit to begin full operation.

The inverter control panel is located behind the navigation seat and is the unit marked inverter with various push buttons on it and a small read out screen. There are four buttons. The Select (sel) is on the far left...this button indicates which read out you can see on the small screen. As you push select it scrolls as follows: voltage for starter (1) and house (2). The next push is Amp hours that you are using or charging (net of drain and charge together); the final push shows you total amp hours you have used (e.g. 250 amp means that many amp hours starting, then it begins a countdown of amp hours used...so -35 means 35 amp hours have been used so far. Once you reach over 100 amp hours it is time to consider recharging. Once you are at -200, the various electronics may begin to show effect.)

The control panel has three other switches, left to right is "set", then "charge" then "invert." To charge the battery from either engine or shore power, make sure the charge button is pushed. To use the inverter, push and hold in for a second the inverter button. Turn it off by pushing it again. Note that you only turn on the inverter when you are immediately planning to use it for some AC purpose.

Typically, then, you can scroll through the window and see voltage in both battery banks, the amp drain you are currently using (or charge if you are charging battery) and, finally, the total amp hours you have used so far. The information is critical whether or not you are using the inverter. You will quickly note that using the inverter or the coffee pot is sufficient to create a -90 amp hour per hour drain immediately. Conversely, running the engine at full rpms will create a plus 90 amp hour charge. It takes about three hours to charge the batteries fully from a -200 amp hour drain.

**UNLESS YOU ARE ACTUALLY USING THE INVERTER, THE INVERTER SWITCH SHOULD BE LEFT IN THE OFF POSITION. YOU ONLY USE THE INVERTER WHEN YOU ARE DISCONNECTED FROM SHORE POWER AND NEED AC FROM THE BATTERIES.**

**THUS AT THE DOCK OR WHENEVER NOT ACTUALLY USING AC POWER WHILE DISCONNECTED TO SHORE POWER TURN THE INVERTER OFF. YOU DO NOT NEED TO HAVE THE INVERTER SWITCH ON "ON" TO USE SHORE POWER TO CHARGE THE BATTERIES OR TO USE SHORE POWER WHEN CONNECTED. THUS THE INVERTER IS SWITCHED TO OFF AT ALL TIMES EXCEPT WHEN ACTUALLY USING AN AC APPLIANCE WHEN UNDERWAY OR AT ANCHOR. The inverter will cause drain if "on" even if no AC unit is turned on.**

When the inverter is switched on and there is no shore power, it will automatically provide AC power to the AC panel *under the staircase*. THIS MEANS THAT POWER WILL BE SUPPLIED ONLY TO THE PORT SIDE OF THE VESSEL AND THE "NAV-COM" CIRCUIT BREAKER WHICH IS FOR BOTH THE COMPUTER, AND TELEVISION-DVD PLAYER.

IT IS CRITICAL, THEREFORE, ONCE THE INVERTER IS TURNED ON, TO REGULATE THE USE OF THE POWER BY TURNING OFF THE CIRCUIT BREAKERS UNDER THE STAIRCASE NOT NEEDED. **MOST IMPORTANTLY, TURN OFF THE FORWARD PORT POWER OR AC POWER WILL FLOW TO THE HEATER IN THE MAIN SALON, DEPLETING THE BATTERIES.**

Practically speaker, one uses the inverter for the computer, for the coffee pot, for the microwave, and for television and DVD. If you need to plug in some other AC unit, turn on the galley circuit breaker under the staircase and plug in the unit to the galley outlets.

Recall that the same circuit breaker operates both the computer and the television/VCR. If you wish to use the television/DVD without using the computer, turn off the computer by using the switch on the computer itself in the navigation station (open the doors under the station table top). Turn the computer switch off, leave the Nav-com circuit breaker on, and power will flow to the television/DVD but not to the computer. Remember to turn off the computer screen as well.

When underway, if you wish to use the navigation program on the computer, then normally the navcom circuit breaker is left on so that the NAV-computer program may be used. Normally one should leave the AC circuit breaker for the galley off as well as for the forward area so that one does not drain the batteries by mistake. With the various GPSs with charts on board, it is seldom necessary to use the navigation program on the computer and one saves much power by using the various DC powered GPS charters. The navigation program on the main computer is linked to the GPS and will show the vessel on the chart in its actual position.

*TURN ON THE AC BREAKERS FOR THE PARTICULAR USE YOU ARE NEEDING AND TURN THEM OFF THE MOMENT YOU ARE DONE. AND IF YOU ARE NOT USING ANY AC POWER, TURN OFF THE INVERTER IMMEDIATELY SINCE IT USES POWER EVEN WHEN NOTHING IS RUNNING AND TO AVOID DRAINING BATTERIES IN ERROR.*

In terms of AC power consumption, the microwave uses the most, followed by the coffee pot and computer. Do not use the AC to heat the cabin by use of the main cabin AC heater. That would drain the batteries entirely in a few hours. Better to use the propane stove as described elsewhere in this manual. As for the microwave, that uses so much power that it is useful to turn on the engine to begin charging the batteries concurrent with turning on the microwave.

### **3. THE PROPANE SYSTEM FOR COOKING**



#### ***A. COOKING WITH PROPANE***

The **stove/oven** is in the galley and utilizes propane from tanks located above deck in the wooden box covered with canvas on the forward deck. *There are TWO switches that must be turned on to get propane from the tanks to the stove.* The first is a DC circuit breaker on the DC board outboard panel labeled LPG (liquid petroleum gas) and the second is under the coffee pot, a rocker switch with a large red pilot light (hereafter called "**Safety Switch.**")

The propane is stored in the large deck box with tanks inside on the forward deck. The three such tanks located there are comprised of two tanks of 2.5 gallons, and one of 1.5 gallon. Only

one tank is hooked to the system at a time so one may have to alter tanks if you run out of propane.

You know if you are out of propane by failure of the gas to flow and confirm same by opening the box on the foredeck and checking the gauge on the hose connected to the propane cylinder. If the gauge is at zero, you have used all the propane in the tank.

If both the circuit breaker is on as well as the red pilot light and rocker switch in the galley under the coffee pot yet no propane comes out when the burners are turned on, the odds are good the tanks are empty. **TURN OFF BOTH THE SAFETY SWITCH IN THE GALLEY AND THE CIRCUIT BREAKER BEFORE YOU CHANGE THE TANKS.**

To change the tanks, one takes a wrench or two to the forward box, (they are in a blue bag above the engine) check the valve at the top of the connected tank and determine if there is no pressure. If there is pressure, then something is wrong with the system and you should seek professional repair. If the gauge is empty, turn off the valve of the connected tank first, then alter the connection to the next tank. Remove the empty tank and store outside the box so that one remembers to later fill it. Turn on the valve at the top of the new tank and the gauge on the hose should shoot up to show pressure.

**PROPANE IS AN EXTREMELY DANGEROUS GAS, HEAVIER THAN AIR THUS CAPABLE, IF THERE IS A LEAK, OF ACCUMULATING IN THE BILGE AND BLOWING UP THE BOAT. ALMOST ALL EXPLOSIONS ON BOATS STEM FROM LEAKING PROPANE. WHILE MANUFACTURERS USUALLY ADD SCENT TO THE GAS, IT IS ODORLESS AND ONE CANNOT RELY ON SMELL.**

**FOR THAT REASON, THERE ARE NUMEROUS SAFETY DEVICES ON OUR PROPANE SYSTEM WHICH PROTECT THE VESSEL.**

### **1. PROPANE SNIFFER:**

On the angled bulkhead facing the steps is a round faced unit which normally has a green LED lit. If the light is off, the unit is off and you should immediately turn it on...the plunger switch in the galley near the floor is the on-off switch. The unit, when turned on, will go through a safety check (red, yellow, green light and a beep) and then remain lit on green.)

**Either propane or any other hydrocarbon gas in bilge will set off the alarm.** (Thus, oil in the bilge water will also set off the alarm if it is there in any quantity.) It is high pitched beep from the unit. If that alarm goes off, extinguish all flames immediately and turn off the engine, lift the floor boards immediately forward of the companionway steps and air out the bilge. Be sure to turn off the propane safety switch while waiting for the air to clear.

If the air does not clear, or if the alarm continues to go off, turn off the propane at the tanks themselves, air out the bilge, and do not use the system until a professional checks it.

### **2. STOVE SAFETY VALVES**

The stove itself has a safety device which ensures that propane does not continue to flow if there is no flame to burn it. **Each burner has a valve that automatically closes if there is not enough heat.** Thus, to start any burner one must heat up that safety valve or the gas will not flow.

When turning on the burner, one pushes the burner valve in and turns the handle counter clockwise a short way. **(Note that the lower the flame you want, the further you must turn the handle...this is a safety mechanism in itself since at low heat one is as far away from turn off as can be...to turn off the handle one must turn the flame up.** With a match one lights the flame. SO LONG AS YOU PUSH THE BURNER CONTROL HANDLE IN, THE GAS WILL FLOW. One holds the handle in until the automatic turn-off valve is warmed enough to keep the gas flowing, usually about twenty seconds of flame. Then one may turn the handle to the desired level of flame and release the handle.

To turn off the stove, simply turn the handle past highest heat to off. Once the stove is off, turn off the two stove switches as well.

There is no thermostat with the oven, which is lighted in the same manner as the stove. There is a temperature gauge on the oven front and one simply adjusts the flame to keep the heat at the desired state...believe it or not, it works remarkably well.

Note that the oven door pulls out by lifting the wooden handle to unlatch it, then slides down and into the oven itself. This avoids having the gimbaled stove tilt forward and allows the oven to be open without the door filling the entire galley.

In heavy seas one can rig a harness to the two rings on both sides of the oven so one can "lean back" while the vessel moves. The harness is stored under the bottom drawer aft of the stove.

**ALWAYS WEAR CLOTHING TO COVER YOUR FRONT WHEN COOKING UNDERWAY...EVEN WITH A GIMBALED OVEN, THE MOVEMENT OF THE VESSEL CAN CAUSE SPILLS. ALWAYS CLAMP THE POTS AND PANS ON AND ALWAYS BE PREPARED FOR SPILLS...THE MOST TYPICAL CAUSE OF BURNS ON VESSELS IN SCALDING FROM SPILLING SOUP OR WATER!**



## B. HOT WATER HEATING

There are **two ways** to have hot water on board. The water, with **dockside shore power** plugged in, is heated in a five gallon hot water heater using AC power, AC circuit breaker outboard of the navigation table on AC board. This is very efficient heating but uses far too much energy for the inverter. The AC water heater is located underneath the pilot berth (portside) of main salon, aft section, and is the stainless steel square unit.

Secondly, **the engine has a system which, while running, also heats the water** in the same five gallon unit by heat exchange with the engine cooling system. This system automatically heats water whenever the engine is tuned on. After about fifteen minutes of running the engine you have the unit filled with hot water and it is a good time to shower, without using propane, after running the engine to charge the batteries and/or run the refrigerator.

## 4. ANCHORING THE VESSEL



## A. Basics of Anchoring: Dropping the Anchor

The vessel is equipped with **three anchors, two on the bowsprit, one on the stern**. The two forward are both CQRS, the starboard one on chain rode, the port on rope rode. There is approximately 200 feet of chain and 300 feet of rope.

Before anchoring, turn on the windlass by the **circuit breaker in the forward cabin**, starboard side near the hanging locker. Normally, you should run the engine at the same time that you sue the windlass since the windlass requires a great deal of electricity. If the unit does not come on, push the red circuit breaker button on the switch HARD and see if that works...it may have blown and it is not obvious when it is popped out.

The technique for anchoring is simple. Assuming the chain rode is to be used, pull out by hand about ten feet of chain so that you have enough slack to move the anchor. Make sure the anchor chain is still attached to the chain clutch on the wheel so that it will not pour out. Go forward onto the bowsprit and pull the anchor up and slowly drop the anchor down below the roller since the anchor shackle can otherwise become jammed in the slot above the roller.

Return to the windlass. There are four locks which stop the anchor from falling out.

The chain itself is held by a pin on bowsprit in a U shaped shackle ("safety brake") for when underway so that the anchor cannot get loose in a sea way. The pin on the safety brake must be pulled whenever the anchor is in use and the chain pulled out and placed above the shackle so it may run free. **DO NOT USE THE PIN FOR ANCHORING. ITS SOLE USE IS TO HOLD THE ANCHOR CHAIN IN PLACE WHEN UNDERWAY.**

Next, there are two metal paws, one on the roller, one on the long movable arm which allows one to raise the anchor manually.

The fourth anchor hold is a clutch on the drum with four arms to tightening or loosening with the metal handle and which, when tightened, stops the drum from rolling by use of friction.

The handle for tightening the clutch and also for raising the anchor manually, is clipped to the brackets on the cats head on the deck and is a stainless steel pipe. (Spare pipes are stored jammed between the gunnels and shrouds on the port side.)

To drop the anchor, first run the chain above the safety brake on the bowsprit. Then, both paws must be "up" and away from the gears on the drum which turn when the chain is rolling out. Further, the clutch must be loose so as to allow the drum to roll.

When preparing to drop the anchor, once the anchor is hanging free below the roller, tighten the clutch to hold the drum, then raise both paws. ***The anchor will then be held only by the friction on the drum.*** With the handle ready, all one must do is loosen the friction using the steel handle to loosen the spokes of the brake and the chain will pour out dropping the anchor in the water.



The anchor "hooks" into the ground, thus the vessel must be slowly moving astern as the anchor is dropped. Once the desired level of chain or rope is out, "lock" the chain by tightening the clutch (tightening the clutch handle) with the stainless steel handle or flipping one or both of the metal paws to stop the turning of the windlass. At the same time, tell the person on the wheel to slip the vessel into neutral, assuming you are motoring astern. If you are sailing astern, let loose the sheets. If you are drifting astern, simply wait.

The chain should hook in at an approximate 60 degree angle to the vessel...the less the angle, the better. Once "hooked" wait at least a full minute watching the angle to ensure that the vessel is securely anchored before attaching the snubber (see below) or turning off the engine. Remember that tide in San Francisco Bay coming in can increase depth by six to eight feet and the length of rode should be dropped assuming full tide will come in.

In rough seas, wrap the chain or rope rode around the Samson posts in a figure eight. Leave the handle for the clutch handy since if one must raise the anchor, you will have to tighten the clutch quickly.

Before leaving the bow after anchoring, and after dropping the requisite chain for the snubber as described below, **slip both paws into place and tighten the clutch**. The anchor will therefore be left in position to immediately raise it if necessary. The circuit breaker should be turned off except in dangerous holding ground. If in dangerous holding ground, maintain an anchor watch, using either the hand bearing compass, the rangefinder or the man overboard "X" on the GPS units to determine drift. (Remember that some drift, to the end of the rode, is going to occur whether the anchor is dragging or not.)

**DO NOT ABANDON THE ANCHOR WATCH UNTIL YOU ARE SURE YOU ARE HOLDING AND IF THERE IS A CHANGE IN WEATHER OR CURRENT, BE SURE TO CHECK THE ANCHOR AGAIN.**

The chain rode is attached to the Samson posts inside the chain locker by rope rode so that it can be cut in an emergency. The chain may also be cut by the cable cutter stored underneath salon aft berth cushions. This is a hydraulic chain cutter, only to be used if emergency.

The chain locker is forward of the forward berth, access achieved by opening the door at the forward end. The locker is divided, rope rode on the port side. The solenoid for the windlass switch is located on the upper starboard side of the chain locker.

*THERE IS A TENDENCY FOR THE ROPE RODE TO BE TRAPPED UNDER THE CHAIN RODE WHICH SPILLS OVER THE PORT SIDE. ALWAYS FLAKE THE ROPE RODE ON DECK FOR ANY ANCHORING...AND INDEED, IF ANCHORING IS EVER CRITICAL IN TIMING ALWAYS FLAKE EITHER ROPE OR CHAIN ON DECK TO AVOID THE DANGER OF TANGLES IN THE LINE AS IT EXITS THE ANCHOR HAWSER HOLE.*

**The basic rule in anchoring is three times chain rode length to depth in protected water...e.g. in thirty feet of water, drop ninety feet of chain. For rope rode, use five times depth in protected waters. Try to anchor is no less than fifteen feet and no more than fifty feet. In unprotected waters, drop seven times chain rode and ten times rope rode.**

Recall that your "drift pattern" should be considered the length of rode minus depth of water as a diameter of a circle. Thus, if you are in twenty feet of water and sixty foot rode, your diameter is forty feet from where you dropped the anchor IN ALL DIRECTIONS.

While a stern anchor can hold the vessel from swinging in change of current, for purposes of safety continue to use the above diameter measuring. And recall that each other vessel should have the same circle around it...thus two vessels with rode out as above must be separated by a minimum of eighty feet to be safe.

Under the rules of the sea, the first vessel anchored has priority for location and sea room...nevertheless, assuming another vessel violates your space, if they will not move, you must, for the tangling of the rodes and drift onto shore will occur regardless of fault.

In dangerous anchoring ground in which you fear that the anchor will be caught under rocks or debris, rig another line to the ring above the anchor itself so that you may pull it up or forward to release it. Remember to buoy the ring line since otherwise you will lose the ability to pull on it.

### 1) Snubber line

The **snubber line** is normally hooked to the netting to starboard of the bowsprit and is used both as a shock absorber for the chain and to improve the angle of the rode...the lower the angle, the better the holding. Since the snubber is attached to the bottom of the bow, the angle is immediately reduced. To use the snubber, once the anchor is set, attach the hook to the chain below the roller, then release another twenty feet of chain. The snubber will take up the slack and you are then anchored from the bottom of the bow.

When raising the anchor with the snubber, bring the chain up to the point when you can reach down below the roller and unhook the snubber, reattach the snubber to the netting, then bring the chain up the rest of the way. Be careful of tangling the snubber line in the chain as you bring the rest of the chain up.



## B. Raising the Anchor

Make sure the two paws on the windlass are in place and tighten the clutch as tightly as possible since the final pull of the anchor out of the ground will require a good deal of power. Turn on the circuit breaker in the forward cabin, turn on the engine, and use the push button deck switch to starboard of the windlass to slowly raise the chain. (The switch is underneath the plastic protective cover which is lifted up to gain access to the switch.)

**IF THE WINDLASS CANNOT PULL THE CHAIN AND THE CHAIN IS NOT SLIPPING, DO NOT CONTINUE TO PUSH THE SWITCH...IT WILL SIMPLY BURN OUT THE WINDLASS MOTOR. INSTEAD, IF YOU HAVE NOT RIGGED A BUOY ON THE RING ON THE TOP OF THE ANCHOR, TRY MOTORING DIRECTLY OVER THE ANCHOR AND AHEAD OF WHERE IT IS SET...THIS SHOULD YANK IT OUT. BY BEING DIRECTLY ABOVE THE ANCHOR, THE FLUKES ARE MORE EASILY PULLED FROM THE BOTTOM.**

**IF THAT FAILS, THEN PULL OUT THE CABLE CUTTERS FROM UNDER FORWARD BERTH MATTRESS, BUOY THE CHAIN WITH ONE OF THE FENDERS, OR PERHAPS TWO, THEN CUT THE CHAIN. CALL A DIVER UPON YOUR RETURN TO THE DOCK TO RETRIEVE THE ANCHOR. REMEMBER YOU STILL HAVE A SPARE ANCHOR ON THE PORT ROLLER IN THE EVENT OF EMERGENCIES.**

## 5. THE ELECTRONIC OVERBOARD ALARM SYSTEM

This system provides protection for falling overboard when no one is on deck but the person falling overboard or during night watches. The alarms are wrist bands kept midcabin starboard side just forward of the computer screen. The unit itself is turned on by a switch above the locker there, marked Overboard Alarm. It has an LED light to indicate when on.

Each alarm unit has a button in the middle. Once the main switch is on, press the button once per each unit to "initialize" the particular unit. The unit will flash red and green for a few moments then once initialized flash green every thirty seconds. Each unit must be initialized, one after the other. About two minutes after the last unit is initialized, the main unit will sound a loud beep to indicate that initialization is over.

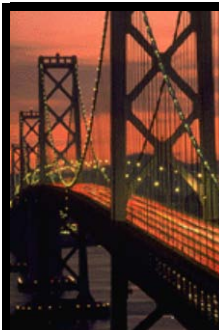
Thereafter, if any alarm unit is more than a hundred feet from the boat, the main unit will sound a loud alarm, indicating that the wearer is off the boat. For night watches, this is particularly valuable and each crew should have a strobe connected to his or her life vest to indicate position in the water.

Once the main unit is turned off for any reason, the entire initialization procedure must be repeated. If your alarm unit is working correctly, a green flash will show on its face every thirty seconds or so. If the unit below decks is turned off, your personal alarm will flash red and green for about thirty seconds, then have no flash at all.

Before any voyage out the Gate, test the system by initializing and having crew walk away from the boat on the dock. Remember, if the system tests OK you will have to turn off the main unit and reinitialize. Remember also to turn off the unit if crew are going ashore or into the dinghy.

**DO NOT CONFUSE THIS OVERBOARD ALARM, LOCATED ABOVE THE COMPUTER CABINET, AND MARKED "OVERBOARD" WITH THE TWO OTHER SIMILAR ALARMS...THE HIGH WATER ALARMS, (TWO IN THE FORWARD BERTH, ONE ON THE ANGLED BULKHEAD UNDER THE COFFEE POT, MARKED "FWD" AND "AFT" AND ONE IN THE COCKPIT MARKED "BILGE") WHICH INDICATE HIGH WATER UNDER THE FORWARD BERTH OR MAIN CABIN FLOORBOARDS AND, SECONDLY, THE EMERGENCY SIREN AND RED LIGHT ABOVE THE DOORWAY TO THE PORT REAR CABIN WHICH IS MANUALLY SET BY A SWITCH IN THE COCKPIT AND ALLOWS FOR THE HELMSMAN TO CALL THE CREW ON DECK FOR ANY EMERGENCY, SAID LIGHT MARKED "EMERGENCY."**

**Anyone on night watch, when crew is asleep, must wear the OVERBOARD ALARM and keep it activated**



## **6. HARNESSES AND JACK LINES**

There are two types of harnesses on board; ones with inflatable bladders which become life jackets if immersed and others which are simply harnesses. The inflatables are located in the red net bag in the starboard rear berth, are marked "off shore" and in the same bag are tethers to be attached to the metal rings in the front of the inflatable harnesses.

There are also non inflating regular harnesses are stowed under the cushion at the navigation table seat. Do not confuse the off shore inflatable harnesses with the purely inflatable vests which are marked inshore and are stowed in the blue net bags. The offshore harnesses are the only ones with metal rings on the front to be attached to tethers.

**ALL HARNESS ARE ADJUSTABLE AND MUST BE WORN BY ALL CREW WHEN OUTSIDE THE GATE OR IN STORM CONDITIONS.**

The **jack lines** are normally stowed in the red net bag and spares are hung on the inside portside dodger on the hooks. They should be run along both decks all the way to the foredeck. When off shore or in storm conditions, one uses the tethers to hook onto the jack lines BEFORE leaving the cockpit and not removed until one returns to the cockpit. They are loose enough to enable one to work at the mast and boom without disconnecting. While one may fall into the water when connected due to their length, one will still be connected to the vessel and recovery should be relatively easy.

On the bowsprit is a through bolted ring on the floorboard and that is where you should attach your harness BEFORE venturing out on the bowsprit.

Inside the cockpit hook onto the lifelines or stanchions. When entering the cockpit from below, hook on before moving about the cockpit.

*The usual overboard situation occurs as someone enters or leaves the cockpit to go below and unhooks just as a wave hits. Also note that at night you should keep **overboard light** and red headlamp with you on watch as well. Each harness and most foul weather gear has such lights already attached. Check their batteries before going on watch.*

*Thus, crew in offshore or storm conditions have the following safety gear:*

1. Life vest with harness and tether
2. Red headlamp
3. Rigging knife including fiddle
4. Overboard alarm, initialized
5. Strobe light on vest, tested.
6. Foul weather gear, boots, hat and gloves.
7. Whistle

## **7. OVERBOARD PROCEDURE AND EQUIPMENT**

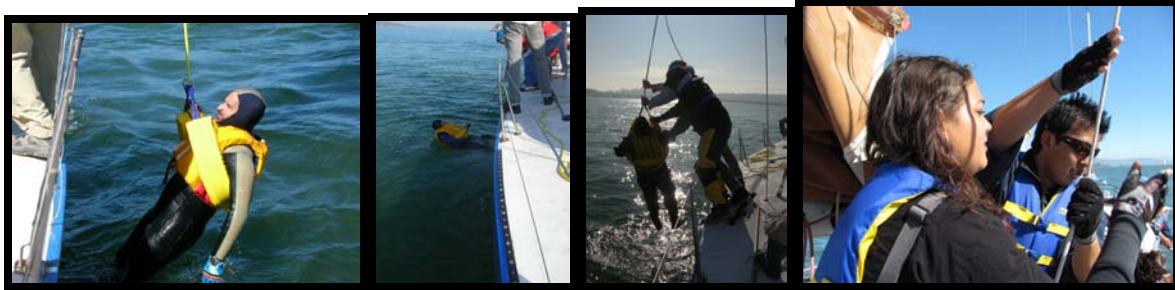


Techniques for retrieval for overboard crew must be practiced to be efficient and captain and crew should attempt the various maneuvers in calm waters, especially retrieval of the person from the water by use of harness and/or life sling. BE SURE TO HAVE THE CAPTAIN BE THE PERSON OVERBOARD AT LEAST ONCE SO THE CREW CAN PRACTICE.

Assuming a person is overboard, the following steps must be taken immediately. The captain is the one to assign the specific tasks described below. If the captain is overboard, the second captain or, if not, the HELMSPERSON assumes that responsibility.

1. The entire remaining crew is called on deck with the cry Man Overboard. The emergency switch in the cockpit to port of the companionway should be pulled as necessary if ambient noise or sleeping crew so requires.
2. One crew is assigned the sole task of keeping watch on the person in the water. That crew points with his entire arm in the direction of the person in the water so the rest of the crew and captain may instantly see the direction.
3. The man overboard pole, life ring and strobe is thrown into the water. If the navigation computer is on, the man overboard key is pressed on the computer program.
4. The boat is turned into the wind to stop it.
5. All lines are checked to make sure they are not in the water (jib sheets, etc.) and only then the engine is turned but kept in neutral. Again, check no line in the water, then the vessel is kept in the wind as the main and jib are lowered in the order selected by the captain, normally jib first if no contrary orders.
6. If the engine does not start, use the glow plug for thirty seconds and try again. If the engine still does not start, go immediately to the section labeled "Overboard Drill Under Sail." If the engine does start, after turning into the wind, drop all sail, and motor back slightly to windward of the person in the water. Move to windward of the person, put the vessel in neutral and drift towards the person. If using the life sling, three crew are sent to the mast to rug the block and tackle kept in the box forward of the dodger labeled "overboard rig" while another crew pulls out the life sling and deploys it behind the boat as the boat motors back to the victim. The person keeping eye on the victim does nothing but keep the person in view.
  - a. At night, the captain should have crew push the MOB button on the GPS so as to have a location to search if the person is lost. At night, only the strobe on the person is likely to be visible. Note that the same process is used at night for life sling, and there is a strobe on the life sling so the victim can locate it in the water. **IT IS VITAL FOR ALL CREW TO USE READ HEADLAMPS AT NIGHT MOB TO AVOID BLINDING CREW AND CAPTAIN WITH WHITE LIGHT.**
7. The life sling procedure should be practiced before any emergency. Essentially, the boat circles the victim and the ring eventually comes close enough to have the victim put it on. Once on, the victim turns the ring so he can be pulled in without having to have in the water. Once back to the boat by people pulling the yellow line, the loop on the ring is clipped to the block and tackle which is now attached to the spinnaker halyard and the person is told to turn in the life sling so he or she is facing the boat. The person is then hauled up using the block and tackle.
8. If for some reason the life sling does not work, lower the ladders, lowering the one attached on the starboard side and place the portable ladder forward of the dodger on the leeward side. One person should lines and secure the ladder, tying it to the stanchions. The person may be able to climb up, with some assistance.
9. There are also two throw lines, each side of the cockpit, which can be tossed to the person in the water if still nearby. Stop the boat immediately if the victim grabs the line or he will be pulled under. You may still need to use the life sling to use the block and tackle to get them into the

boat even if they grab the tow line. Simply drop the life sling to them as they hold onto the throw line, pull the yellow line forward, rig the block and tackle and bring them on board.



10. The overboard person should be made warm immediately and treated for shock.

11. If unable to quickly retrieve the person in the water as above, immediately call the Coast Guard on Channel 16. This would be a Mayday situation. At night, always call the Coast Guard.

12. If out the Gate, throw the entire overboard pole, strobe and ring in the water. Note that in any kind of swell, the person will be almost impossible to see. The pole with its flag on the top is visible in up to ten foot swells and its strobe is far more powerful than the strobe on the life vest. It also has dye attached to the ring and a drogue. The person in the water should attempt to remain near the pole. Even with the pole, it is a good idea to use the life sling method and simply pick up the pole once the person is safe on board.

### **A. ENGINE NOT STARTING....SAIL PROCEDURE FOR MAN OVERBOARD.**

1. Assign someone to watch the person in the water as always.

2. Throw overboard package astern (pole, strobe, horseshoe buoy) and life sling if the person is still very close to the boat. If the person is close enough to grab the life sling, follow the instructions on the life sling or as described above. If the person misses the life sling or is too far away, retrieve the life sling first so that it does not tangle in the prop and proceed as follows.

**3. Head beam reach but slowly away from the overboard person until crew on deck ready to help. Assign crew to handle lines in cockpit. Send block and tackle crew to mast to prepare it. Once crew ready, tack and sail to windward of person in the water, deploying life sling behind boat.**

4. Slow down as you approach by letting the main start to luff. Remember you have much momentum on a vessel of 15 tons. Sail around the person precisely as if under motor power, having the life sling come to the person. You will need crew to handle the jib and main.

5. Once person can touch yellow line immediately stop boat, letting all sails luff. If the boat begins to sail again since out of control consider having crew roll in jib but not if it makes the

mast crew bringing the victim on board shorthanded. The key is bringing the person back on board. Only drop the sails if you cannot stop the boat otherwise. Consider heaving to.

6. Once the person is on board, treat for shock, etc.



## 8. REFRIGERATION

The vessel is equipped with 12 volt refrigerator which utilizes a "cold plate" which is a rectangular metal box which freezes and requires half a day or more to defrost. This allows two hours of engine time to normally maintain the refrigerator cold for a day.

The circuit breaker for the refrigerator is on the panel outboard of navigation station. Outboard of the top load doors of the refrigerator are two thermometers for the refrigerator, the forward one indicating the temperature on the outboard portion of the refrigerator next to the cold plate which normally acts as a freezer, the aft one in the refrigerator portion.

The temperature control for the refrigerator is located in the refrigerator, top shelf, inboard.

The more food you have in the refrigerator, the more time it takes to cool the box...and the more you open the lower door, the longer it takes to again lower the temperature since the cold air



pours out. On extended voyages, one normally turns off the refrigerator for much of the day, running it for only two to four hours a day to conserve power.

## **9. WATER TANKS; WATER MAKER; SHOWERS**

### **a. Water Tanks:**

Water is stowed in three stainless steel tanks equaling **one hundred and fifty to sixty** gallons in all: the forward tank is under the forward berth and holds eighty gallons; the midtanks is one small ones, linked together with the port tank located under the salon seat, port main cabin, and holds fifty gallons. The tanks are all linked together. There are **two water fills**, one on the starboard forward deck, the other midship, port deck.

*TO FULLY FILL ALL THE TANKS YOU MUST REMOVE THE CAPS ON BOTH FILLS BEFORE FILLING EITHER SO THAT THE AIR CAN ESCAPE INSTEAD OF FORMING AIR POCKETS AND BLOCKING THE FILL UP OF ALL TANKS.* The tools to open the caps are on the ready rack port side companionway at the entrance to the cockpit.

The **valves to turn on or off the various water tanks** are located under the floorboards, main salon, forward of engine. The tanks are labeled port and starboard for the port tanks and forward tank, respectively. There are three valves, one port, one forward, and one for the midship tank. Each tank has a large inspection plate on its top which may be removed with a wrench. There is a dip stick for the forward tank located on its top.

The **escape lines for air** and to allow water pressure to enter the tanks are located in the galley sink (for forward and midship tank) and in the head sink (for port tank.) When filling, you can hear air escaping from all of them and when the tanks are close to full the escape lines will gush water. Keep filling, however, until water gushes out of the fill holes and wait five minutes then slowly fill again after the air has a chance to make its way up to the fill holes. When full, the tanks will bring the bobstay lower shackle under water slightly.

Water pressure is provided by a **pressure pump** located under the salon aft seat, port side, next to the refrigerator compressor. It is turned on via a **circuit breaker marked "water pressure"** on the DC circuit board. Assuming it malfunctions, or to save electricity, **hand pumps** exist in both the head and galley (fresh cold water) but for hot water and for showering, you will need to run the pressure pump. It is a demand pump, turning on when the pressure in the line is low. When cruising it is a good idea to keep the water pressure pump off to avoid losing all water in the event of a leak. If the pump runs for more than twenty seconds after the water is turned off, or if it keeps going on and off when the water is off, you have a leak and should turn off the pressure and locate the leak. A schematic of the water lines is attached to this manual. **Spare hoses** are under the floorboards next to the valves, spare **hose clamps** are located over the engine.

There is also a **salt water pump** in the galley, labeled such, for initial dish washing.

## b. Water maker

The unit is a PUR 80, capable of **generating 3.2 gallons per hour** (hence "80" gallons a day) and which works by reverse osmosis. This simply means it forces salt water through a membrane that separates the salt from the water and creates freshwater.

The Circuit breaker for the unit is located on the wall behind the navigation seat (Red LED) and there is a special **water quality reject switch and alarm** in the forward berth, starboard wall.

The unit is located underneath the floorboards of the forward berth, with **spare filters and parts** behind the port aft salon seats. Before the unit can be turned on it must be prepared by having the bacteria that accumulates in the unit when not used for months killed by first running a special mixture through it. *IT IS CRITICAL TO READ CAREFULLY THE FULL MANUAL AS TO ITS OPERATION BEFORE ATTEMPTING TO UTILIZE THE WATER MAKER. THE MANUAL IS LOCATED IN THE LOWER LOCKER FORWARD OF THE NAVIGATION STATION. THE UNIT CAN BE DAMAGED IF IT IS OPERATED INCORRECTLY.*

The water drips into the large forward tank under the forward berth directly from the water maker. While the manual claims three point two gallons per hour, one should be conservative in determining actual replenishment of water and a good practice is to add three gallons of water back into your supply for each hour the unit is actually run. Keep a written record in the log book of hours run and computation of water you feel you have left. **An hour meter for the water maker** is located in the bulkhead behind the navigation seat (the only hour meter on that bulkhead.)

When the tanks are full, water will drip out of the escape lines (overflow pipes that empty into head and galley sink) in any sea way and the lost water will quickly equal gallons. As such, a good idea is to only refill the tanks to about twenty gallons below their fill point (thus keeping about 140 gallons total) to avoid this loss. DO NOT BLOCK THE ESCAPE VALVES SINCE THEY ARE NECESSARY TO BRING AIR PRESSURE INTO SYSTEM AND KEEP THE WATER FLOWING.

*Under no circumstances allow the water to be utilized to the point where you are depending on the unit to supply necessary water. Always keep in the tanks sufficient to complete your voyage PLUS twenty percent. (Assume a gallon per day per person to drink and up to three gallons per day in hot climates.)*

Remember that if you use the engine to heat the shower water, it will create five gallons of hot water. That should be enough for an entire crew to take an adequate shower and you will know when to stop since you will use all the hot water.

For any prolonged voyage, spare emergency water in containers should also be stowed on board.

The Abandon Ship Kit #2 (normally under the companionway steps) has an emergency hand operated water maker in it for use in the life raft. In emergency conditions this could be used on

board. Directions are on the unit but suffice to state that instead of a 12 volt engine pushing the water through the membrane, you accomplish the same by a small hand pump on the unit.



### c. Sun showers

Sun showers are located under the sink in the head. They may be filled with freshwater, left in the sun, and hung from the rigging for hot outside (or inside) showers.

### d. The Shower

The shower is forward of the head and requires the water pump to be on for its use. A sump pump removes the water under the floor of the shower stall and pumps it out through a separate throughhull under the forward berth, port side. The sump pump is operated via a float switch with manual over ride (just like the bilge pump) but, like the bilge, is located well under the water line thus can reverse flow if the one way valve adjacent to the sump pump jams.

The **sump pump and its turn off valve** are located under the shower floorboard. The **switch for the sump pump** is located forward of the head sink, outboard bulkhead, marked "sump." It should be left on automatic. The shower also has a drain hole with a screw cap at the bottom of the shower pan should the sump pump fail and the water may be drained to the bilge where the bilge pump will remove it.

If you hear the sump pump running when no one is taking a shower, it means either that the shower was left on or, more likely, the one way valve is leaking back into the sump basin. Check the valve immediately since under way tremendous pressure can be in the line as the vessel pushes through the seas. There is a **turnoff valve to close the inflow from the sump pump** under the grating in the shower. Turn the yellow handle if required to stop inflow. You may have to plug it with one of the wooden plugs (located in engine compartment, angled bulkhead, in the basket.)

*Remember the way to shower when cruising: wet your body: turn off water and lather up: wash down with water. Use fresh water sparingly.*

The water is heated either by shore power if plugged in (AC circuit breaker outboard at navigation station) or by the engine heat exchanger. Since you must use the engine to charge the batteries and cool the refrigerator in any event, time your showers to utilize that means of hot water.



## 10. HEAD AND HOLDING TANK

The head is an **electric head with manual override** should that be necessary. The **electric button** is immediately behind the head and so labeled. To manually override, insert the handle kept in the wood holder aft of the head into the round opening for it forward of head (removing and reinserting cotter pin.) Instructions for its use are located on the seat cover. **Instructions for repair** are in the spare parts bag under the sink. Plugs for the through hulls are taped to them.

If the electric pump is not achieving clearing of the head, try alternating between opening and closing the valve (dry versus flush) for ten pumps each for a while...this can remove blockage. If that does not work, you may have to disassemble the plumbing to find the blockage, a difficult and unpleasant task.

By far the most common problem is blockage of the outflow pipe by too much paper or calcification of the plumbing. The calcification can be reduced by use of vinegar in the water, but ultimately removal of the plunger unit to replace parts or remove blockage will be required. Be sure to shut off through hulls (both intake and out flow) before beginning that sad task.

**Holding Tank:** The boat has a very small holding tank under the forward berth which is pumped out on deck. At sea and on most voyages it is not used but, instead, the waste is vented to the sea.

To begin using the holding tank, open the locker immediately behind the toilet and you will discover a Y valve. Turn it to the marked position and the holding tank is in use. It is a four gallon

tank and waste is removed via a throughdeck marked "Waste" on the port side. A second and labeled pushbutton immediately behind the head operates a pump which empties the holding tank via the throughdeck should vacuum on dock not be available.

It is not necessary to close the through hulls (they are vented loops) but for storm preparation it would be a safe precaution.



## 11. SINGLE SIDEBAND RADIO (SSB) AND SATELLITE PHONE

The SSB unit is installed at the navigation station, outboard, and is fused internally, thus has no circuit breaker. The amplifying unit is in the starboard rear cabin, only the control unit is at the navigation station. The rear stay acts as its antenna. ***When transmitting do not allow anyone to touch the rear stay above the insulators or severe shock will ensue.***

To use the system merely turn on the control unit and it is ready for use. Instructions for its use are in its manual and a laminated sheet exists in this manual for calling for **distress (2182)** though the offshore telephone system was discontinued by the telephone company in 1998. The unit is now used for distress and ship to ship.

A more common method of offshore communication for yachts is now the satellite phone stowed just forward of the SSB at the navigation table.

For the SSB, while the laminated cards give you what buttons to push for calls or distress, you will need to review the manual to determine how to communicate for all other matters...it is basically simple, a matter of punching in numbers, but the climate, time of day, and other

conditions in the atmosphere radically affects which channel to utilize (as described in the laminated sheets) and a full description of use of SSB is found in the book on the subject located in the drawer under the port salon seat forward (near the head) marked "ships papers."

The key to SSB is the selection of band predicated on time of day and climate conditions. It takes patience and often you must abandon the effort for a few hours and try again when the sun is lower or higher. Nevertheless, you can normally make a call anywhere in the world if you put in the hours to do so and the 2182 is a monitored distress signal to all vessels and the Coast Guard (See Abandon Ship section of this manual and laminated Sheet for Abandon Ship Procedure.)

The transmission of the SSB signal requires massive voltage and may affect the other electronics. For instance, the AUTOHELM will normally go off course while transmitting, etc. Turn off the AUTOHELM and make sure your handheld GPS is on and working before transmitting...though the on board various GPS have not yet been affected by such transmission. Receiving does not require much use of energy

Normally, it saves energy and requires much less skill and practice to use the satellite phone which has its own internal battery, much like a cell phone, and which can be recharged as a cell phone is. Using the satellite phone allows a normal telephone call but recall it is an international call so you have to begin each call with the country code. (Thus, since the United States international code is 001, a call to San Francisco with the number 415-392-2018 to the United States would be 001-415-392-2018. The satellite phone only works with clear access to the sky. One turns on the unit, raises the antenna in the unit, and goes on deck to make contact with the satellite. Once satellite connection is indicated on the unit read out, the call can be made. The phone is charged with a standard cell phone type charger (the one for the Droid or Kindle) for either AC or DC.

If a vessel is in sight and communication is desired, VHF communication makes more sense than SSB or Satellite phone. Recall that Channel 16 is the hailing channel. .

## **12. WEATHERFAX**

This unit is located forward of the navigation station in the lower locker, above the manual files on a roll out shelf. It has no circuit breaker, instead using a fuse immediately forward of the unit on the shelf. It utilizes fax paper to print out the daily weather maps and predictions of the NOAA and automatically signals into the local station once you turn it on. It stays in standby mode and will start printing the fax out once the signal is received. The readout will also include a schedule of when the transmissions occur so that you can save energy by only turning it on standby a few minutes before the scheduled transmission.

Reading weather maps is a skill developed with practice and an excellent book on marine weather is located in the drawer (with the SSB book) at the foot of the port forward salon. Recall that the maps also print out wave and wind patterns as well as predicted weather.

Fax paper needs to be replaced when the edge of the fax paper shows a red or pink border. Spare fax paper is behind the WEATHERFAX machine (rolls) and the manual indicates how to put it in. You may need to reduce the size of the roll to fit it since we use regular fax paper for copiers to reduce cost and the rolls are thicker. Remove perhaps ten percent of the sheet, cut the remainder so that the end is angled, and insert into machine pursuant to the manual. 4.

### **13. MISC. CRUISING ELECTRONICS**

- a. ASI:** This device, above computer screen at navigation table, both indicates location, speed and characteristics of vessels in the area and broadcasts to them the same information about Benjamin Walters. The control panel of the unit allows you to scroll through the various vessels shown and by highlighting them, get the relevant information. The unit has an on and off switch but normally is automatically on when you turn on the other electronics.
- b. Radar Scanner:** This unit is located next to SSB at navigation station and indicates when the vessel is being scanned by radar and the general direction of the scan. Our own radar must be set on standby before using this since otherwise our own signal will drown out any other. It has settings for high sensitivity or not and beeping or not. A good way to check for radar bearing traffic without having to use the high drain of the radar.
- c. Barometers:** Two electronic barometers are located on aft wall of navigation station and an aneroid barometer is located in main cabin, starboard wall.
- d. Thermascope:** Located in the locker starboard forward salon, this unit uses heat to locate objects in low visibility situations. An instruction card is kept next to the unit. Note that the unit takes five minutes to warm up.
- e. Distance Scope:** Located in navigation table, this unit will provide distance in meters to an object relatively nearby using a beam that bounces back. It's top distance is about half a mile. Useful to determining if overtaking a vessel and for determining anchor drift.
- f. Handheld Depth Meter:** This unit is located in the navigation table and, when placed slightly below water, measures depth. Useful for anchoring situations or when using the dinghy.
- g. Handheld Wind Meter:** Stowed aft wall navigation table, the unit measure wind force when faced towards the wind.
- h. Night Vision Scopes:** Two are on board, a third generation binocular and a fourth generation monocular, both located in navigation station. These units increase ambient light to create vision. NOTE THAT IF NO LIGHT, THEY WILL EACH SHOW NOTHING VISIBLE-ON MOONLESS DARK NIGHTS, THEY HAVE LIMITED USE. USE THE RADAR AND THERMASCOPE IN THOSE SITUATIONS. IN MORE THAN ONE ANCHORING WE ENCOUNTERED NOTHING VISIBLE IN THE NIGHT SCOPES WHEN SURROUNDED BY VESSELS ACCORDING TO RADAR.
- i. Steiner Binoculars (with bearing compass):** Located in compartment to rear of computer screen, these binoculars are good enough to be used in very low light situations and have built in lighted hand bearing compass.
- j. Stabilized Binoculars:** Two are located on board, both kept below in the glass faced cabinet with the books, starboard aft. Button on top stabilizes the vision.
- k. SAR beacon:** Located on rack port side at base of companionway steps, with instructions on unit, this device sends out a powerful locating beacon to search and rescue vessels and aircraft.

**I. EPIRBs (406):** These units send a distress signal to overhead satellites which are forwarded to Coast Guard. A self deploying unit is on the port davit. A hand deployed unit is on the aft navigation station wall. Directions are on all the units. Be sure to take both with you if you abandon ship. There are also two "locator" small units on two offshore harnesses. These units are not nearly as powerful as the other two but can be used in an emergency and, of course, if the wearer falls overboard.



#### **14. DINGHY: DAVITS: OUTBOARD**

The boat has a hard dinghy on davits and can tow a ten foot hard bottomed inflatable. The inflatable can be stowed on deck, partially deflated. It is not recommended to tow the inflatable outside the Gate.

A twelve volt inflater is located in propane locker on the forward deck. A foot pump is kept in the forward locker of the inflatable, itself. Oars for the hard dinghy are kept on foredeck, attached to stanchions. Oars for the inflatable are kept inside the inflatable.

The inflatable should always be topped off before passengers are loaded. Fuel for the outboard is kept in the inflatable or under the helm seat in the container marked "gasoline." Remember to take the first aid kit, a handheld VHF, a flare kit and at least one hand held compass with you on any trip aside from a quick trip to shore.

Tools for the outboard are stowed in the box at the bottom of the helm seat, so labeled. Be sure to bring spare fuel with you when taking the inflatable since the inflatable is quite difficult to row.

Part of storm preparation, as discussed in the relevant portion of this manual, is appropriate stowage of the dinghy prior to storm conditions. The dinghy and inflatable, when deflated, can fit easily on deck, lashed down securely and any major storm should not have the dinghy hanging from the davits. A single following sea hitting the dinghy could tear the davits out, holing the vessel, if the dinghy is hit and filled with water.



If the storm breaks before the dinghy can be moved or the inflatable deflated, consider towing it or, better, store it perpendicular to the water so that it cannot fill up. The problem is that you still have a large, flat surface to be hit by waves and wind and make the vessel harder to manage. Stow it if there is any danger of poor weather and if you are making any ocean passage you should deflate and stow the dinghy before commencing the trip. Be sure to check that the gasoline container is secured before undertaking any significant voyage and that fumes cannot escape.

The outboard can be attached to the rear pulpit and should be covered by a canvas cover whenever possible on long voyages. In protected waters, it is common to tow the inflatable with the outboard set up on the inflatable. Any sea way can make this extremely unlikely to succeed.

Do not stow the outboard below decks unless a survival storm is imminent and remember it must be stowed up right to avoid salt water harming the motor. Secure it well due to its weight. The manual for the outboard (in folders forward of navigation station) should be referred to for all operations.

Note that the motor itself holds its own gasoline to be filled at the top of the motor. Any major trip, however, requires that you bring additional gasoline to top up.

The outboard can be used with the hard dinghy but it is heavy for that small boat and no more than two persons should be on board if the outboard is used with the hard dinghy. It is preferable to use the outboard only with the inflatable.

In an emergency, **the dinghy with the outboard can "tow" the vessel** but should do so as a side tow, e.g. tied onto the starboard or port side of the vessel quite tightly with the entire dinghy and engine as a single unit acting as an "engine" and using Benjamin Walters to actually steer the vessel by use of its own wheel. You will still need to keep someone in the dinghy to control speed, of course...and note that going in reverse in the dinghy to slow down the entire vessel will result in the entire vessel slewing around since the "engine" is now off center...plan accordingly.

There are two inflatable kayaks sometimes brought along, usually stowed forward over the forward hatch and easily launched from the sides. The paddles are normally stowed in the hard dinghy.



## 15. STORM GEAR/ACTIONS

### a. Sea Anchor

Located in a yellow bag in the locker behind the companionway steps, the sea anchor is made to be deployed in heavy storm conditions, all sails lowered, hung from the cathead, through the bow sprit rollers (careful of chafe with the anchor and rollers) and cleated first to the cleat on the windlass, then double cleated to the winches on the mast.

One deploys the anchor with all sails down and slowly drifts backwards. The anchor keeps your bow to the wind, thus avoiding waves knocking the vessel sideways and rolling it. Without the sea anchor, the boat will drift sideways to the wind and can roll over due to the wave action.

This is the theory, at least. Many indicate that heaving to is preferable or continuing under sail even in the worst conditions. Sea anchors work only if there is plenty of sea way and the alternatives of sailing with reduced sail are no longer viable due to exhaustion of crew or gear failure.

Instructions for its use and deployment are in its manual in the lower locker forward of the navigation table. Line for its deployment should be the thickest line at the mast belaying pins and a minimum of **two hundred feet** should be let out. Remember that you should also attach the line to deflate the "parachute" so that you can bring the sea anchor in when necessary.

A typical reason for failure of the anchor is chafing in the line allows it to part or the constant jerking of the line ultimately tears out gear or breaks the line. Be sure to push cloth blankets and towels around the line and tie them into place to avoid chafe and, if you can, tie the snubber to the line to allow some give...you will slowly drift backwards with it deployed. Be sure to maintain a watch on the sea anchor...checking at least each half hour to renew the chafe guard and check the fittings that it is attached to.

### b. Reefing, Stay sail and Trysail

The first line of storm defense with the sails is reducing the standard working sails. Recall that we have three reefs in the main and that the jib, with its roller furling, can be reefed to a very small sail, indeed.

Unless going to windward, a very small jib and third reef in main will easily handle wind to thirty five knots and dropping the main entirely (which is most useful if need to point) works well in thirty five to forty knots.

**Above forty knots the staysail alone, which also can be reefed due to the roller furling, works well, and it has been cut for heavy weather.** You can also work its sheets from under the dodger, a very nice luxury when spray gets thick. It does not point well, being so far back, and the most you will get is perhaps fifty degrees off the wind. Nevertheless, it is the sail to use, increasingly roller reefed, as the winds climb above forty and up to survival conditions.

**Above forty five knots you may consider using the trysail and above fifty knots you should consider lying ahull with the sea anchor deployed or heaving to (back winding a reefed jib or reefed staysail, having the helm set to windward so that you sail up to luff, fall off, then sail up to luff.) Keep in mind that the dodger, itself, acts as a sail in such winds, when beam reach or downwind, thus laying ahull actually keeps the equivalent to a bit of sail up.**

The *trysail* is stowed behind the sea anchor in the locker behind the companionway stairs. You will have to remove the main from the track to raise it and tie it's clew to the rear reefing eyes which are thru-bolted to the boom. It is loose footed and raised with the main halyard.

RUNNING UNDER BEAR POLES  
LINES WARPED BEHIND



a. c. Deck Preparation;

1. Tighten all portholes and latch and lock the forward and butterfly hatch. Make sure their canvass covers are snapped.
2. If the main is not to be used, lash boom to the boom crutch, tightening the main sheet to assist in holding it in place. Consider removing entire mainsail from boom.
3. Remove both spinnaker bag and hammock from foredeck and stow below. Remove grappling hooks and stow below.
4. Check all the belaying pin lines at the mast and shrouds since green water can wash the lines away. Either tie the lines on or bring them below.
5. If you have fuel containers on deck, tie them down. If they are in the gunnels they will be under water much of the time with tremendous pressure on them.
6. Consider removing the anchors on the bowsprit and stowing midships below, both to lower the weight and avoid the danger of them coming loose and to make rigging a sea anchor easier. If you decide to keep one or both on bowsprit, triple tie each anchor in place.
7. Check carefully now as to how you will rig sea anchor if necessary with anchors tied to bowsprit. You may even decide to rig the lines for the sea anchor ahead of the storm so that all you need to is attach and deploy the sea anchor during the storm. Be sure to tie such lines down so they do not come loose before deployment.
8. If you are considering warping a line from the stern, prepare same for immediate deployment.
9. Remove dinghy from davits and stow on deck.

10. Bring out the bags for the trysail and sea anchor and stow them for ready use. Familiarize crew the deploying both.
11. Close and latch all deck boxes, putting shackles through the mast boxes, deck boxes and cockpit boxes.
12. Clear all unneeded gear from the decks, bring up harnesses and check abandon ship boxes and bags.
13. Pull out dorad vent plates to close same (port mast pulpit box) and close those vents you consider appropriate and make the vent plates ready if green water floods the deck regularly.
14. Consider removing main entirely and stowing below. Consider removing Jib entirely and stowing below.
15. Remove rear anchor from davits.
16. Remove doors to companionway and replace with washboards (located in port rear berth, under berth. Consider rigging seat in companionway instead of washboards if watch keeping requires that, but in that case keep washboards handy in the event the following seas become truly dangerous.
17. Carefully check all running and standing rigging for wear and tightness of shackles and cotter pins. Check for spare shackles and cotter pin availability.
18. Check sail repair cut. Check rigging repair kit. Check hydraulic cable cutter.
19. Tighten screws on stanchions.
20. Check reefing lines and Dutchman. Check preventer and boom brake.

21. Check and perhaps double tie life raft and abandon ship lashings.

*There should be nothing left on deck that can be stowed anywhere else. Everything is tied down. Every heavy object is double or triple tied. Assume seas will wash the deck with green water and anything not stowed or tied down will be washed away. It is always a mistake to leave anything out that could be stowed before the storm hits.*

#### **D. Below Decks Storm Preparation**

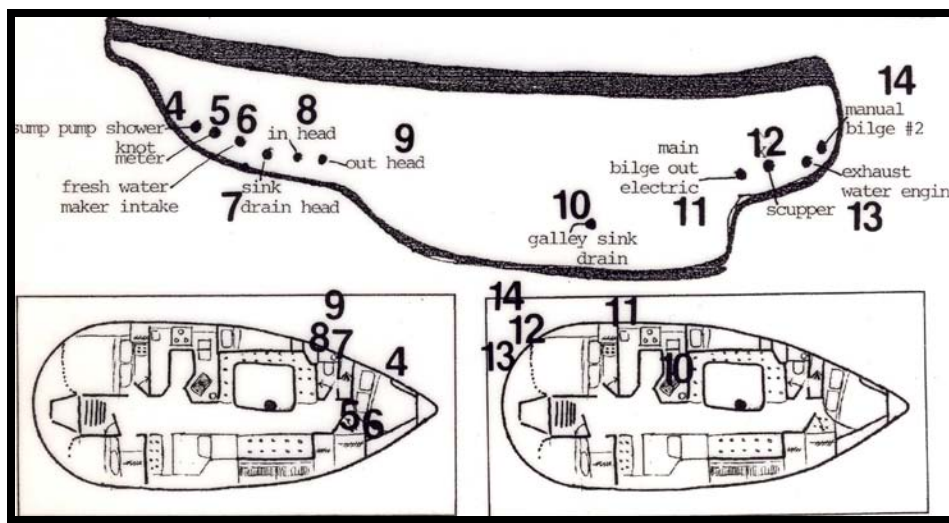
- Rig lee cloths for pilot berth (lee cloth kept under pilot berth cushion) and lee board for salon berth under its berth.
- Stow any and all loose gear so it can survive a full knock down. Any heavy object (tools, batteries, knives) should be double fastened.
- All lockers should be closed and latched.
- All portable electronics placed in zip lock bags.
- Check through hulls and portholes closed except for engine and bilge pumps.
- Check each bilge pump, manual and electric. Check high water alarms. Empty bilge. Make sure bucket is handy.
- Check engine oil, water and transmission fluid. Top off. Stow more fluid in handy location.
- Hang extra foul weather gear in head shower and rear port cabin for easy access.
- Check harnesses to ensure are still inflatable. Make sure each crew has own harness, labeled, with strobe.
- Check overboard system and pass out wrist units to each crew.
- Make enough warm and ready drinks and soup in thermoses for the next twenty four hours. Create baggies with high energy snack foods and instant soups for ready access in galley.

- Rig galley harness for stove. Stow all loose gear in galley. Don't forget to stow all knives galley.
- Check propane canisters and make sure plenty left so do not have to change canister on foredeck during storm.
- Put matches in water proof baggies.
- Create storm watch schedule. Include who is called on deck first for emergency (e.g. watch just off called first, etc.)
- Create drift course and determine sea room and tactics
- Print out latest weather map. Write down barometer reading in log.
- Train crew on storm tactics will use.
- Go through Abandon Ship Card and Distress Calling Procedure; make sure each crew has laminated card.
- Go over overboard recovery methodology.
- Consider sea sick medicine and melatonin. Make sure readily available for crew in plastic baggies near the navigation station.
- Check Medical Kit and First Aid Kit. Make sure entire crew know where it is and have access to manual for first aid.
- Show crew how to Mayday both on VHF and Satellite phone.
- Have crew check out life raft and abandon ship bags and assign crew to do specific abandon ship tasks.
- Check all electronics including backup systems. New batteries in all appropriate electronics. Stow night vision, binoculars and thermal scope in holders under dodger.
- Check emergency tiller system and show crew how to use it. Restow.
- Consider running engine to top up batteries.
- Strobes for each crew member. Red headlamps for reach crew member. Rigging knife for each crew member. Whistle for each crew member.
- Get some of the crew to begin sleeping now, while relatively easy.

- Put some dry clothes in garbage bags assuming that all else will be wet below. Each crew should do so.
- Close latches on refrigerator top. Make sure all fiddles on all shelves are in place and secure. Lock all hatch covers.
- Eat now while can. Even if not hungry.
- Add some additional food and liquids to abandon ship bags.
- Bring Log up to date so have your start position even if your electrics go down. Place log away from possible water entry.
- Go through emergency procedure with crew that follows this section of manual. Assign tasks.
- Relax. You will have three days of work but if you are prepared, it will be an adventure, not an ordeal.

THE LAMINATED CARDS FOR THROUGH HULLS ARE IN RACK ABOVE NAVIGATION TABLE. ABANDON SHIP CARDS SHOULD BE GIVEN TO EACH CREW. IF CREW DOES NOT ALREADY HAVE ONE, MAKE THEM READ THE SECTIONS AND KEEP ONE OF THE ABANDON SHIP DUTY CARDS IN NAVIGATION STATION.

BE SURE TO ADVISE THEM THAT NO ONE WILL LAUNCH LIFERAFT OR PREPARE TO ABANDON SHIP UNTIL VIRTUALLY NO OTHER CHOICE AND THAT CAPTAIN WILL DECIDE WHEN THAT IS NECESSARY, NO ONE ELSE....THAT THE VESSEL IS THE BEST LIFERAFT AND THE OVERWHELMING MAJORITY OF SMALL BOATS ARE ABANDONED TOO SOON BY CREW WHO FEEL THAT A RUBBER DUCKY THAT CANNOT BE STEERED IS SOMEHOW SAFER THAN A POTENTIALLY SINKING VESSEL. BE PREPARED TO ABANDON SHIP BUT DO NOT UNTIL YOU HAVE TO *STEP UP* INTO THE LIFE RAFT.





## 16. EMERGENCY GEAR: PROCEDURE

### a. Emergency Tiller

The emergency tiller is located under the helm seat on the shelf below. You will have to remove the entire helm seat to install it on the large square fitting directly above the rudder. To get clearance, you may have to remove the wheel, unscrewing its bolt on its aft side. Expect some resistance when steering via this large device. Remember that the AUTOHELM is directly connected to the rudder post and should still work even if the steering cable parts.

### **b. Hull Breach Tools, Etc.**

The critical issue for hull breach is locating the hole or fitting failure before the water covers it and makes it harder to locate. That is why the **alarms** for the bilge and high water are critical-they give you a chance to find it while it should be easier. Wake all crew to assist since time becomes a critical issue. Recall that the emergency wake up switch is to port of the companionway, a plunger switch. Once crew awake, hand out flashlights, and divide up search for inflow that is described below. Depending on amount of water already in boat, and size of crew, you may wish to assign someone to start pumping bilge but recall that stopping the flow is more important than trying to counter it.

Remember: two electric bilge pumps under floorboards at foot of companionway. Engine bilge pump forward of engine. Two manuals, one forward of companionway, one next to helm seat. You may wish to assign one person to steer and pump at the same time. Handle for that bilge pump is in starboard rear cabin near abandon ship bag. A bucket is kept behind companionway steps and a folding bucket jammed under floorboard aft of manual bilge pump below.

Should the bilge pump stay on for more than two minutes or should any high water alarm go on (meaning that the bilge pump must have failed or you would have seen that warning light) move quickly. Recall that there is a forward high water alarm and if that one goes off, check forward first.

IF THE BILGE PUMP HAS FAILED, YOU MAY NOT HAVE A REAL EMERGENCY, SIMPLY WATER SLOWLY ACCUMULATING IN BILGE UNTIL ALARMS GO OFF...TRY TO EMPTY BILGE BY MANUAL OVERRIDE ON BILGE PUMP SWITCH AND WITH FLASHLIGHT SEE IF THE BILGE EMPTIES IN THIS MANNER...IF SO SIMPLY REPAIR SWITCH, YOU HAVE NO SERIOUS HULL BREACH.

IF THE PUMP STILL DOES NOT WORK SEE IF YOU CAN EMPTY VIA MANUAL PUMPS, AGAIN CHECKING WATER LEVEL TO SEE IF YOU ARE MAKING PROGRESS. ONLY IF THE WATER KEEPS RISING SHOULD YOU ASSUME FAILED FITTING OR HULL BREACH.

TURN ON ENGINE CONCURRENT WITH STARTING YOUR SEARCH FOR THE HULL BREACH. MAKE SURE THE ENGINE IS ON BEFORE THE BATTERIES ARE AFFECTED BY RISING WATER. KEEP VESSEL HEADING AWAY FROM ONCOMING WAVES TO LESSON PRESSURE OF WATER ON BOAT AND SEEK TO KEEP VESSEL MOVING AS LITTLE AS POSSIBLE.

Unless you heard an impact, the most likely cause of water inflow is a **failed fitting**. **The chart for all through hulls is located IN CHART RACK ABOVE NAVIGATION TABLE, Plugs for throughhull are in basket inside angled bulkhead of engine compartment. Hoses are under floorboards midships of engine compartment. Hose clamps above engine.**

If you heard an impact, go immediately to that area to plug or fix. Wood is under salon seats, port side and a collision mat is under pilot berth port side. Goop is lowest shelf in locker under coffee pot. Tools are behind salon cushions starboard side.

You may have to go through decorative woodwork to get access to hull breach. DO IT! A **hatchet/hammer and crow bar** are located in oiled rags under galley floor board. Another tool to rip out wood is in holder behind companionway steps. Remember, seconds count...get to the breach fast.

**FAILED THROUGH HULL:** Once locate failed fitting, plug it fast with wood plugs, hammering them in, and repair fitting if can later, once water level is lowered.

**HULL IMPACT BREACH:** If there is a impact hole, stem the leak by stuffing plug into it or, if larger, shove pillows, clothing or blankets into it, then cut wood to size (saw behind starboard salon cushions), goop it and screw it directly over hole. Key is to minimize leak immediately, then do careful repairs as needed later.

The Collision Mat is a yellow thick rubberized sheet that is to be placed over the breach from the outside. The concept is to use the lines or, if the water is warm, send someone over to place the thick mat over the impact hole where water pressure will push it into hole.

Recall that water pressure caused by boat movement can greatly increase inflow, so once locate leak, either stop boat or go onto tack which will keep water pressure minimized.

**THE SEARCH FOR THE BREACH:**

Even a small leak has water pouring into the vessel with high pressure. The lower the leak, the greater the pressure. If did not hear impact, check the fittings first. If cannot locate

leak after checking all fittings then you must have a breach in hull or further along the fittings (for instance, the through hull might be fine but the salt water filter on way to engine may have corroded through.) Unless you heard impact, continue search along hoses of all through hulls before assuming impact hole.

Even if water is getting high and you have not located it, continue searching. It does little good to pump if any sizable leak exists. In calm weather, consider sending someone in scuba tanks over side (be sure to tie him or her on) to check for breach...and if none found, it is a fitting or hose.

A key time is if water is approaching engine compartment level. If so, and you have yet to find the leak, it is time to take additional proactive action. Think about moving batteries higher so further above water. Move emergency starter battery up to cockpit so keep out of water. Keep engine running. Assign a crew to pump bilge (bucket if necessary) and make sure crew have abandon ship duty card handy. Nevertheless, continue the search with bulk of crew, double check you search if necessary. Consider Mayday at this time.

If engine compartment is flooded you will soon have batteries flooded. Once engine compartment flooded to half way up engine, begin calling for help via VHF, SSB 2182 satellite phone and assign one crew to begin readying vessel for abandon ship-BUT DO NOT ABANDON SHIP UNTIL IT LITERALLY SINKS DOWN UNDER YOU. CONTINUE LOOKING FOR LEAK. YOU CAN ALWAYS PUMP OUT BOAT LATER BY HAND AND THE VESSEL IS ALWAYS SAFER THAN EVEN THE BEST LIFERAFT.

**SO, THE FOLLOWING STEPS ARE: BILGE PUMP LIGHT ON FOR SEVERAL MINUTES OR HIGH WATER ALARM GOES ON:**

- 1. WAKE CREW**
- 2. DETERMINE IF FAILED BILGE PUMP OR NOT. IF NOT,**
- 3. STOP BOAT**
- 4. CHECK FITTINGS USING CARD. (UNLESS HEARD IMPACT)**
- 5. CHECK HOSES TO FITTING**
- 6. IF WATER STILL COMING IN AND NO FAILED FITTING, LOOK FOR IMPACT HOLE**
- 7. PLUG HOLE**
- 8. PUMP DRY**

**RADIO FOR HELP IF ENGINE IN DANGER OF SUBMERSION AND HAVE YET TO FIND THE LEAK**

**REMEMBER, CAPTAIN ASSIGNS TASKS TO CREW FOR BOTH SEARCH FOR WATER ENTRY, RADIOING FOR HELP AND PREPARING TO ABANDON SHIP.**

## **C. FIRE PROCEDURES AND TOOLS**

Fire destroys far more vessels than sinking. Most fire is caused by electrical shorts, then propane leaks. The wetter the condition of the vessel (e.g. bad weather) the more likely a short circuit will occur, thus you can expect a combination of hard conditions and fire.

Fiberglass burns explosively and emits a noxious smoke that will quickly make fighting the fire impossible. It is therefore critical to stop the fire as soon as possible.

There are five fire Extinguishers on board. The main and best is behind the companionway steps. There are three small ones in addition: one in the galley outboard of the liquor cabinet, one in the galley underneath the floor board and one in the forward locker across from the head on the door, inside. A halogen automatic extinguisher is in the engine compartment.

IN the galley is a fireproof cloth to throw over the stove if there is a fire: it is located under the stove in a plastic bag.

A bucket is located behind the galley steps.

Remember to throw the main power switch for the batteries if a fire begins to cut off all electrical current...otherwise the fire may cause additional shorts and additional fires. The two battery switches are located in the port rear cabin, near the floor.

If the fire extinguishers fail to extinguish the first, you will likely lose the vessel. You can use buckets to pour water on the fire. Remember to close hatches that may feed air to the fire.

A fire out of control is one of the few instances in which a quick abandon ship may be necessary. If the interior, or hull or deck catch fire, it is time to launch the life raft and get the abandon ship boxes out immediately, making sure the life raft is tethered to the vessel, but assuring enough of a tether so that it cannot catch flame. Assign one crew member to abandon ship pursuant to the laminated card while the rest of you attempt to control the fire. (Recall you will have to turn on the batteries again to use the SSB.)

Be sure to jettison the **propane tanks in the forward locker** if the fire begins to spread in that direction. The smallest of those canisters exploding would destroy the entire vessel. Likewise, jettison the **spare fuel for the outboard.** ) Diesel fuel is NOT flammable so you need not be overly concerned with the danger of the fuel tanks exploding.

**Fire, more than sinking, requires immediate action. Before any significant cruise, assign duties and review tasks.**



#### **D. MEDICAL KIT: FIRST AID KIT**

The medical kit in a large blue bag under the starboard salon cushion is the complete kit containing those items listed on the attached laminated sheet. It is for the life raft and major emergencies. The first aid kit in the cockpit cabin top port side contains basic trauma first aid supplies. Band-Aids and the like are kept in the head cabinet, above the sink. A dental first aid kit is kept with the medical Kit. A first aid manual is in the medical kit.

Prescription drugs are kept in the Safe. The location of the safe and its combination are obtained from the captain.

The Navy Medical Procedure Book ( a large orange book) is kept in the drawer in the main salon, port side, forward, at floor, just aft of the head.

**Recall that you can obtain medical advice on the SSB if necessary by contacting the coast guard or by satellite phone in the same way.**

**A defibulator is located in the forward cabin, starboard side in a red kit. The unit is utilized for heart attacks and instructions for its use are in the kit. Once you turn it on it will walk you through the process. It is far more effective than mere CPR, though both will be used quite possibly.**



## **E. MAST OR RIGGING FAILURE TOOLS AND PROCEDURES**

### **1. Standing Rigging Failure**

#### **A. SHROUDS/STAYS**

Assuming the failure of a shroud or stay, it is critical to drop the sails before the mast also fails, if at all possible. The key is to remove all pressure on the mast as soon as you can. Let all sails fly (let go the sheets) and drop the halyards as soon as possible.

Even in storm conditions this procedure makes sense unless the waves are so large that the vessel faces capsize. In that case, try to aim the vessel in a manner to minimize pressure on the rig that has failed (downwind if forestay fails, to windward if rear stay fails, etc.) while starting the engine so that you can maintain position while dropping the sails.

Once the sails are down, attempt to utilize the halyard to act as a jury stay or shroud while you attempt to make more permanent repairs. Remember that as soon as the jury stay is attached to loosen the opposite shroud or stay to remove some of the pressure.

If it is a shackle or cotter pin failure, you should be able to reattach the original shroud or stay. If it is a failure of the cable, then you must make due with your thickest line and make a rope shroud or stay. Be sure to reef if you wish to sail after repair, testing the rig carefully.

1. SPARE SHACKLES UNDER HELMSEAT.
2. SPARE COTTER PINS IN BOX UNDERNEATH HELM SEAT.
3. RIGGING FAILURE BOX IS FORWARD OF DODGER AND HAS VARIOUS TOOLS TO REMOVE DAMAGED RIGGING.
4. HYDRAULIC BOLT/CABLE CUTTER UNDER SALON SEAT FORWARD OF ENGINE COMPARTMENT.
5. STANDARD CABLE CUTTER IN COMPARTMENT NEAR EMERGENCY TILLER, UNDER HELM SEAT.

Benjamin Walters is heavily rigged with double shrouds and stays in most locations and a double bobstay as well. Even the failure of the forestay still has the staysail stay in place so that perhaps only the top third of the mast will fail. Only the rear stay is a single cable (replaced with new stay in 1999) and it is possible that most of the mast would still be saved since the lower shrouds angle back from the mast. *The key is to quickly and efficiently remove strain on the mast by dropping the sails as soon as possible.*

Recall before starting the engine that lines in the water easily exist with a rigging failure. Check all lines in the water before engaging the engine.

STEPS:

1. REMOVE PRESSURE ON RIG QUICKLY

2. REMOVE DAMAGED RIGGING AND REPLACE WITH NEW, EVEN IF LINE.
3. TEST NEW RIG CAREFULLY AND SEEK TO AVOID SIGNIFICANT PRESSURE UNTIL TESTED.
4. CONSIDER MOTORING BACK

### b. Mast Failure

Assuming that the mast buckles before you can drop sails, the important step is to avoid having the mast damage the crew, hull or deck while hopefully saving as much of the mast as possible for jury rig. Most likely, the mast up to the spreaders will remain standing.

The HYDRAULIC **Bolt/cable cutters** are located underneath salon cushion forward of engine compartment. Manual cable/bolt cutter under helm seat. **Hacksaw and spare blades** are located in rigging failure box forward of dodger, so labeled.

A bent or broken mast, often with sharp aluminum pieces exposed, is a danger to the vessel and crew, especially in a sea way when it may hit against the hull and hole it. You must seek to cut the broken mast free of vessel if necessary, bringing the pieces on board if possible. **Remember that the mast will pierce the hull in any kind of sea way and, if unable to quickly secure it or bring it on board, then use the hydraulic bolt cutter to cut it free and, if necessary, let it sink.**

If possible, tie the mast on board so its movement is minimized. Once you have the mast tied tightly to the vessel so it cannot rock and hit the hull, you will need a block and pulley arrangement or use of winches to bring it on board. All this can be done over time so long as the mast is tied securely enough not to hurt the hull and its drag in the water does not endanger the vessel.

Also recall that cables, running rigging and sails will be holding the rigging on. It may be necessary to cut those free though, of course, if you can save any of it you should. Be sure to make sure all are clear of prop before starting engine.

A jury rig can easily be achieved if the mast has been saved up to the spreaders. The staysail becomes, your jib, the trysail your main or, if you are lucky, you still have the main and merely reef it down as appropriate. Recall that you will have lost the antenna for the SSB and the VHF and possibly the radar. You will have to rig the spare VHF antenna (in navigation table) and the rear shroud can still be used as an SSB antenna but **BE CAREFUL NOT TO TOUCH IT DURING TRANSMISSION.**

**Rigging supplies are in rigging box forward of dodger. Spare shroud and wire cable is located under helm seat in steering compartment.**

**To avoid fire, carefully check all the wires that once went to the mast before turning on the circuit breakers. Recall that the mast has a strobe; radar; running lights; anchor lights; steaming lights; spreader lights; VHF antenna; SSB antenna; radar; wind instruments; and television antenna;**

If the mast is entirely gone, the whisker pole can be used to rig a lateen rig with whatever mast may be left and recall the spinnaker is always available to rig for downwind sailing. The windage

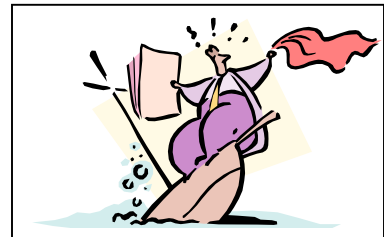
on the vessel alone, with the dodger up, will allow two or so knots of progress off the wind. And, of course, there is always the engine.

## **2. RUNNING RIGGING FAILURE; SAILS**

The sail repair kit is kept in basket on the angled bulkhead to the engine compartment. Spare blocks and shackles are in the port side mast box. Spare lines exist on belaying pins near mast and shrouds. Sail patches are in the sail repair kit. Cotter pins of all types are in box in helm seat as well as the rigging repair box forward of dodger. The trysail is kept behind companionway steps in the locker. The spinnaker is stowed in a bag on the port forward lifelines. Also remember that the boom vang and the preventer have many blocks capable of use if failure to more important systems occurs.

### **a. WINCHES:**

Winch repair kits are kept in box at foot of helm seat. Lubrication for winches are kept in locker under coffee pot. Winch wrench, when needed, are in box at your feet at helm. Spare blocks are kept in boxes at mast. There are no spare winches on board.



## **17. MANUAL BACKUP SYSTEMS**

### **A. Navigation**

There are two GPSs which are handheld on board, one in forward cabin and one in cockpit to starboard of companionway. There are two VHF's which are handheld one on navigation table one on bulkhead near companionway steps. Spare batteries are in lowest drawer aft in galley.

A sextant is kept in box behind companionway steps and the relevant books for it are under salon seats in lockers on starboard side.

A lead line is stowed in propane box on foredeck.

Backup running lights are on propane box (remove the cover) and are turned on with plunger switch in head above sink.

All standard navigation tools, from parallel rulers to bearing compasses are located in the navigation table...lift the lid.



## **B. Other**

Oars are located either in the dingy or lashed to the lifelines forward.

Handheld compass exists above the companionway step and in the binoculars stowed behind companionway step.

Singling flags are stowed behind port salon seat cushions, forward outboard.

All sinks have hand pumps for water. The shower does not.

The windlass may be manually worked using the stainless steel handle attached to it or lashed to port shrouds at the bottom.

**END OF MANUAL**

DECEMBER 2012





