

A Cruising Handbook

***Everything we learned from A to Z while
cruising on Callipygia***

***eBook
by
Pat Watt***

July, 2009



A Cruising Handbook: Everything We Learned from A to Z While Cruising on Callipygia.

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Dedication

This book is dedicated to Bill Dillon, without whom my life would not be the same. His love and affection, spirited companionship, frequent forbearance, intermittent willingness to do what I say, and on-going wisdom keep me open to laughter, warmth, growth, and possibilities in our adventures and life journey together.

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Preface

This eBook is the Cruising Handbook section of the Trouser Roller's website (<http://www.callipygia600.com>) as of July, 2009. The web version of the Handbook is at <http://www.callipygi600.com/callnugget/cruising.htm>

We started our cruising career when we bought *Callipygia* in early October, 2000, and we kept at it until July, 2004. During those four years, we refurbished the boat, prepared ourselves, moved aboard, and traveled over 7,500 nautical miles whilst visiting some 18 Caribbean and West Atlantic countries. Being the one with more sailing experience and knowledge, I had the role of captain while it fell to my beloved Bill to swallow the thankless jobs of plumbing, engine maintenance, electrical work, and having to do what I told him.

Early on we read somewhere that good seamanship results from a combination of experience and knowledge. When we were beginners we tried to offset our lack of experience by increasing our knowledge through reading and study of the best practices followed by the experts. As part of my learning process, I wrote down pretty much everything we did, and how we did it. I hope to pass along what I learned through this eBook. I would like to hear if it's useful to you - send me an email to pat@callipygia600.com. I've tried to incorporate all the lessons we learned into the handbook contents. On the website I affectionately call the handbook "Cruising for Dummies" because sometimes we were.

The pages in this eBook are in the general order of mention on the website, and have been grouped herein into Chapters. Each page on the website is included in this document only once (with one exception) to avoid wasting paper for those who might choose to print the eBook. Links abound to enable users to easily navigate within the contents or to switch back and forth to the Internet. Bookmarks allow the table of contents to be opened in the sidebar of your pdf reader.

The advice provided in this handbook is based on the author's experience and is given here purely for educational purposes. It should not be relied on in place of the judgment of any sailor or boater who reads it. It is offered solely as one more opinion on various matters of boating safety and prudence. The captain of any vessel is responsible for making all decisions based on his/her study of rules, regulations, best practices, and recommended procedures. This eBook does not substitute for such study or decision-making and the author assumes no liability for errors made or damage incurred by readers of this handbook.

If you want to read about our travels and adventures, please go to http://www.callipygia600.com/ontheroad/log_index.htm where you can see maps of our routes, read our travel journals, and see photographs we took. Eventually we hope to make an eBook out of those web pages also.

Chapter 1 – Basic Safety and Security

I strongly feel that potential boaters should read and internalize what I call "The First Essentials" of seamanship before getting into other aspects of the cruising life. While cruising, we met or heard about boaters who hadn't, and as a consequence suffered major and minor disasters, including loss of boat and/or life.

Early on we read somewhere that good seamanship results from a combination of experience and knowledge. When we were beginning cruisers we tried to offset our lack of experience by increasing our knowledge through reading and study of the best practices followed by the experts. This Chapter covers what I see as essential aspects of safety and security in the following articles:

- The Four Rules of Preparation
- The Formula for Disaster
- The Black Box
- Safety Fundamentals

The Four Rules of Preparation

These Four Rules of Preparation are as set forth by John Rousmaniere in the essential reference text, [*The Annapolis Book of Sailing and Seamanship, 3rd Edition*](#).

Rousmaniere states that "taking seriously the possibility of emergencies requires the cautious state of mind known as forehandedness. A helpful rule of thumb, laid out by the U.S. Navy, is that safety requires eternal vigilance." He articulates the following four concise rules to avoid such incidents

- Prepare the Boat: Look at everything with a worst case state of mind.
- Prepare the Crew: Assign responsibilities and make sure everybody understands how everything works and what to do if...
- Choose a Safe Route: Avoid bad weather and seasons, make sure all charts etc., are on board, and have a fall back plan in case...
- Prepare for Emergencies: Practice, practice, practice. If you can't do actual hands on practice, do mental practice.

Formula for Disaster

This formula balances the Four Rules of Preparation. It also is summarized from John Rousmaniere's [*Annapolis Book of Sailing and Seamanship, 3rd Edition*](#).

Rousmaniere states that "taking seriously the possibility of emergencies requires the cautious state of mind known as forehandedness. A helpful rule of thumb, laid out by the U.S. Navy, is that safety requires eternal vigilance." Then Rousmaniere sets out a Formula For Disaster to explain the repeated patterns of behavior that appear over and over again in major boating emergencies or losses.

The seven elements in the formula are:

- A rushed, ill-considered departure - this occurs in virtually all bad accidents, where scheduling rather than weather conditions dictates departure.
- A dangerous route -the route selected has predictable hazards (reefs, currents, shoals, lee shores, commercial traffic, etc.)
- There is no Plan B -there is nowhere to go if Plan A turns out not to be do-able.
- The crew is unprepared -shorthanded and open to fatigue, under the influence, or hasn't practiced essential "what ifs".
- The boat is unprepared -charts are missing, lights don't work, or equipment needs repair, etc.
- The crew panics after injury -when someone is injured, the boat must still be taken care of.
- Poor leadership -the captain is weak, ignorant, or macho and/or doesn't properly use the strengths of the remaining crew.

The Black Box

John Vigor is an experienced sailor who has written a number of highly readable and informative books about sailing and cruising. We found his [The Seaworthy Offshore Sailboat: A Guide to Essential Features, Handling and Gear](#) immensely useful when we were shopping for a blue-water cruising sailboat. And we kept his [Boatowner's Handbook: Reference Data for Maintenance, Repair, Navigation and Seamanship](#) sitting by the Nav Station.

In some of his books, Vigor describes a theory he derived after trying to figure out why some boaters have fewer accidents, and endure fewer storms and disasters than others. Below is a synopsis of his theory as it is described in his [Practical Mariner's Book of Knowledge](#), yet another useful reference by this author.

"There is no such thing as fortuitous luck at sea. The reason why some boaters survive storms or have fewer accidents than others is that they earn their luck by diligent and constant acts of seamanship.

"Aboard every boat there's an invisible black box. Every time a skipper takes the trouble to consult the chart, inspect the filters, go forward on a rainy night to check the running lights, or take any other proper seamanlike precaution, he or she earns a point that goes into the black box. In times of stress, in heavy weather or other threatening circumstances where human skill and effort can accomplish no more, the points are cashed in as protection. Those skippers with no points in the box are the ones later described as unlucky.

"The skipper has no control over the withdrawal of points, and once points have been removed, then the skipper must immediately start to replenish their savings, for the sea offers no credit."

We strongly believed in Vigor's Black Box Theory, and practiced its dictums. A few times we came close to disaster but apparently had enough points in *Callipygia's* Black Box so that they were only near squeaks. We met and/or knew of many boaters who didn't put points in their Black Boxes - including some who suffered major disasters, in a few cases fatal.

Safety Fundamentals

This article describes the standard practices we followed while cruising on *Callipygia* to ensure our, and the boat's, safety and security. When appropriate, these were reviewed as part of the boat orientation with visitors. Some of these practices arose because of lessons learned the hard way.

1. At Anchor or Docked:

- Get the weather forecast at least once a day, and if a front or storm is anticipated, collect a weather forecast in the evening before going to bed.
- Before leaving the boat for the day, check the bilges, the amount of current being drawn from the batteries, and make sure the automatic bilge pump switch is on. Also check/adjust the ground tackle as needed.
- If we waken in the night to some wind/rain, go into the cockpit and assess the situation. Check and adjust (if necessary) the ground tackle and initiate an anchor watch if necessary.
- Check the engine oil every Monday
- When leaving the boat for the day, always lock it.
- Take a walk round the deck every day and check the anchor and rode or dock lines for chafe, signs of dragging, etc., and also give the rigging above the deck an eyeball check.
- If it looks like lightning, drop one of the copper lightning shields in the water.
- If someone goes swimming off the boat, someone else stays on the boat at all times, and a length of floating (polypropylene) line is left hanging down the side into the water near the swim ladder.
- Before anyone goes swimming off the boat, check to see if there is any current, and how strong it is. Don't go swimming unless current is negligible.
- After swimming, flush ears out with a mixture of 50% alcohol and 50% vinegar.

2. In the Galley

- When the stove is on, someone is always in/near the galley with an eye on it.
- To turn off the stove, the propane shut-off switch is turned off first to allow propane to clear out from the pipes, and then when the flame has gone out the stove controls are turned off.
- When the stove is in use, the porthole above it is kept open for ventilation.
- Before the frig is run for the day, pump out water accumulated in the bottom.
- Whoever cooks, cleans up.

3. On a Passage

- No alcohol on coastal passages. Occasional glass of wine/beer if desired in clement weather on ocean passage.
- Jacklines are rigged along both sides of the deck from cockpit to bow before leaving on an offshore passage.
- Use radar at night, or during the daytime when meeting traffic or in busy traffic areas.
- Person on watch does a 180° visual check every 8 minutes. At night, or when drowsy, use a timer as an alarm.
- Safety harnesses and PFDs go on at dusk and stay on until dawn. Person in the cockpit is clipped to the boat at dusk. Crew in the cockpit are also clipped on during the day in heavy weather, and also whenever someone leaves the cockpit and goes forward in other than calm conditions.
- No one goes forward to do deckwork unless someone else is up, awake, and in the cockpit.
- Put a reef in the mainsail before dark.
- Non swimmers wear PFDs while in transit whenever they are on deck outside the cockpit.
- Hatches and portholes are kept closed, and before anyone opens one, they check with the captain.
- If it looks like lightning, put handheld GPS and VHF in the oven, and drop one of the copper lightning shields into the water off a lee shroud.

4. Dinghy Safety

- Take the handheld VHF on all dinghy trips in open waters, and a flashlight if going to be out in the dark.
- In areas exposed to offshore winds, except for short trips in calm conditions, take the following items: Handheld VHF, seat cushion (emergency flotation), dinghy Anchor Bag containing anchor (small Danforth, with 4' chain and 60' 3/8" 3-strand nylon rod), kellet (small grapnel) with shackle, and 1/2 gallon bottle of water. Anchor bag also contains a Dri-bag with a whistle, small air horn, flashlight with spare batteries, 4 recently expired flares and one can of smoke.
- If the motor dies and the wind starts to blow the dinghy out to sea, try to row. If rowing will not keep dinghy going to shore/boat, then anchor and call for assistance on the VHF. If anchoring doesn't work, then call for assistance on the VHF and consider swimming to shore and abandoning the dinghy.
- When towing the dinghy, two polypropylene lines are used with a bridle, and shortened up to bring the dinghy close to the side of the mother boat when slowing down to anchor or dock, or maneuver for any other reason.

- Before towing, remove all contents from dinghy. Run motor out of fuel before storing it on the stern rail.
- Non-swimmers take a PFD with them if they go in the dinghy.
- At anchor, the dinghy is kept attached to the mother boat with two lines.
- After using the motor, close the fuel tank vent (keeps water/moisture out).
- At night, lock the dinghy and motor to the side of the mother boat with a metal cable and padlock.

5. Miscellaneous:

- If engine, stove, or Webasto heater are on, make sure the CO detector is on.
- Nothing goes into the head unless it has been eaten or drunk.
- Two radiator clamps are fastened on all hoses that carry water in/out of the boat. These are put on in opposite directions.
- A wood plug of the right size is wired next to the seacock at each thru-hull
- Wash off all skin cuts/breaks with alcohol, however small.
- Never attach a line to yourself, except for a safety line.

Chapter 2 – Starting Off

This Chapter is for those planning to get out of the armchair and onto a boat. It has three articles in it:

- Buying a Boat (Desirable Attributes of a Blue Water Cruiser)
- The Shakedown Cruise
- The Cruising Life

Desirable Attributes of a Blue-water Cruising Sailboat

In doing our research prior to shopping for a sailboat that would carry us across oceans, we developed a list of desirable attributes to guide our boat search. These attributes are shown below -not exactly in priority order, although those listed first were deemed more important than those listed later because for the most part they were integral to the boat and couldn't be added by later if we wanted. *Callipygia* passed this list with flying colors, and in all our travels we never saw another boat we'd rather have.

A major resource in developing the list was the book by John Vigor, *The Seaworthy Offshore Sailboat: A Guide to Essential Features, Handling and Gear*. At the front of this book there is a 100-question test/quiz which gives a quick determination of the blue-water seaworthiness of both you and your boat.

These items are in priority order – things we could add or change easily (given the necessary \$\$) we put at the bottom of the list even though we considered some to be essential; dinghy for example.

1. Affordable. Can we afford to buy and maintain this boat without borrowing or overextending ourselves financially?
2. Pleasing to the eye. Can we love this boat - we know there will be issues with her, so she has to make our hearts smile while we work through them and accept them or else we'll get dissatisfied and grumpy. [During our 4 years with *Callipygia*, we never saw another boat we'd rather have had.]
3. 35' - 40' on deck. Big enough to be sea-kindly and safe in bad weather, yet small enough for one of us to single-hand if we had to.
4. Cutter rig. Easy sail plan for reducing sail.
5. Good survey. Sound condition and structure, and a dry boat. No need to buy our way into too many problems
6. Good ventilation and no air conditioning. No thank you, we have no need for the noise or electrical requirements of air-conditioning, we'll settle instead for a few fans and good ventilation.
7. Heavy displacement cruiser with a full keel and attached rudder. Able to take care of us in bad weather while we hunker down below.
8. Inboard diesel engine powered at not less than 3 hp/ton. Sufficient power to make our way motoring or motor-sailing when necessary, or to power up and get out of a tight spot.
9. Solid fiberglass hull. Easy to maintain and not laminated.
10. Fiberglass deck (not teak). Easy to maintain, and no leaks.
11. Plenty of accessible and well-ventilated storage. This is our home, so we need enough room for books (we had 24 linear feet) and other comforts, plus all the spares, tools, etc. for blue-water cruising.

12. Good solid footing while walking around the deck, and good drainage in downpours or shipping green water.
13. Strong attachments for dock lines and anchor snubber. [Callipygia only had 6.]
14. Strongest configuration for a knockdown (which thankfully we didn't experience.)
15. Solid support for boom at anchor or in a storm, and great extra handhold in cockpit or on deck.
16. Second anchor for storm conditions, and plenty of chain for normal conditions. [Callipygia had only 170' of chain on primary anchor (plus 200' 3-strand nylon line) but there were a couple of times when we wished we had another 50' of chain.]
17. 100 gallon fuel tank. Enough to give us a range of at least 500 nautical miles under power.
18. Enough to last the two of us 3-4 weeks without rain catching, or backup in case one tank gets contaminated or emptied.
19. Comfortable and safe for whoever's on watch, and safe in a seaway, with ability to drain fast if much water is shipped.
20. Minimal maintenance and more support than deck-stepped.
21. Good handholds and foot space on deck for moving around. Essential for safety.
22. Good handholds and headroom below. Headroom for a 6' person, and solid handholds for moving around below when the seas are up.
23. Manual windlass. A bit more work for anchoring, but no likelihood of sticking in a dangerous situation (we saw this happen more than once causing major havoc.)
24. Sails: Jib with roller furling. Easy to handle from the cockpit.
25. Sails: Staysail that hanks on. Bulletproof system, no furling gear to jam, and easy to remove and switch to storm jib.
26. Sails: Storm jib. For use on the inner forestay (replacing the staysail) in storm situations - the Tayana 37' heaves to well with this configuration.
27. Sails: Storm trysail with separate mast track. For use in a storm, without having to remove the mainsail. Also, useful for stability while sailing downwind.
28. Dodger, splash cloths, and bimini. Dodger with easy visibility forward to keep the wind out of the cockpit, and along with splash cloths keep crew in the cockpit dry when water is shipped, and Bimini to shade us from the tropical sun.
29. Folding mast steps. A great assist while going up the mast, and providing essential footholds while working up or on the mast.
30. V-berth with double bed on one side, all berths accommodating 6'. Good space to snuggle, and comfort for tall crew.
31. Manual bilge pump in cockpit and below as backup to the automatic bilge pump. Ability to manually empty the bilges from the cockpit.

32. Refrigerator. Minimal electrical requirements but yet enough space to keep stuff cool, but no need for a freezer.
33. Starting battery separate from house batteries with a battery monitoring system. Enough electrical storage to light and cool the boat, plus run our basic electrical equipment without excessive recharging requirements. Easy way to tell the condition of the batteries (input, output, voltage, status)
34. Autopilot. To relieve the helmsman when under power. (We'd put this way higher on the list, now.)
35. Windvane. To relieve the helmsman while sailing without draining the battery.
36. Mast pulpits. Security while working at the mast. We didn't want all the lines coming to the cockpit, because we think it's important to get used to working at the mast - so it will be more familiar in those cases when something jams or otherwise goes amuk.
37. Swim ladder An easy to drop and retrieve swim ladder on the side of the boat.
38. Lee cloths for the cabin berths. Comfort and security for the off-watch crew to sleep below.
39. 3-burner propane stove with oven. Able to cook pretty much whatever we want.
40. Instructions for all the equipment. So we can figure out how to fix things, or find out where to go for advice and spares.
41. Maintenance record. To know how old the rigging is, what the service record is for the engine, hull, plumbing, and electrical system, etc.
42. Cabin heater. Keep us warm in cold nights or in the winter.
43. Life raft, MOB module, flares, fire blanket, propane and CO detectors, and fire extinguishers. Essential safety equipment.
44. Manual and sea water pump in galley. Ability to pump fresh water if the electric pump fails, or seawater to minimize fresh water use.
45. Radios - marine SSB with ham bands and GMDSS VHF. Essential communication equipment.
46. Dinghy with motor. Ability to get around when at anchor. (We put this near the bottom of the list because even though this is an essential item it's not part of the actual boat.)
47. Radar. Essential for navigation at night when near land, or in shipping areas, or of course in fog. Also a tremendous assist when approaching an unfamiliar harbour with a hard-to-find entrance, or entering or leaving an anchorage at night.
48. Wind instruments (vane and speed) and depth sounder. Depth sounder essential, wind instruments very helpful.
49. Bug screens on portholes, hatches and dorades. Let the air in, and keep the buggers out.

Callipygia's Shakedown Cruise

In the fall of 2000, I wrote this article for the Tayana Owner's Group (TOG) newsletter. It describes how we as *Callipygia's* crew made the transition from fearful wannabe cruisers to real honest-to-goodness liveaboards engaged in cruising the far blue waters.

Ever since I was a kid growing up in Scotland, I dreamed of cruising around the world in a sailboat. The experience as a young adult of enduring a partial dismasting in an east-Atlantic storm did nothing to diminish my desire—although it surely was responsible for the large dose of caution that simmered in the background of my dreaming.

As with many young dreamers, the requirements of adulthood, (in my case, marriage, emigration to the US, child rearing, divorce, and a career) slowly crushed my cruising fantasy until it fell out of my awareness altogether. Then, one evening in 1995, a Richmond, VA, acquaintance showed me a picture of the Pearson 27 she owned and now must sell as she moved to the mid-West. “Eureka!!” My dream exploded into my mind, rushed up from its musty basement, dusted itself off, and brought forth “I’ll buy it” from my unwitting mouth.

I began to develop a 10-year plan that would get me to the cruising life-style by my 65th birthday, at which point I presumed I would retire. I proceeded to take every available course from the Power Squadron and the Maryland School of Sailing and Seamanship. I raced on the Chesapeake a few times to gain a little from that experience and learned how to single-hand the Pearson, aptly named Tempus Fudgeit. In year 3, I concluded that the cruising life was best done in partnership, and being partner-less, I allowed the dream to again subside under my ingrained workaholic habits. Then, serendipitously, I began a conjugal relationship with an old friend, Bill Dillon. After the initial intensity of our connecting subsided we began to look at what life together might be like. Wonder of wonders, it turned out that he too had dreamed of blue-water cruising. Before we knew it we were rapidly fantasizing about how to make that a reality.

One thing led to another, and the D.C. area real estate market rebound of ‘99 produced the necessary boat kitty from selling one of our 2 houses. We put the Pearson up for sale, and thought about what our cruising boat would look like. Armed with a list of 50 attributes (topped by “affordable”) we recruited Teta Howard, of Annapolis Yacht Sales to help us find it. The 12th boat Teta showed us was a nameless Tayana 37, a type with which we were totally unfamiliar. But not for long. After a second look, and checking off our attribute list, we read the review of the model in Practical Sailor’s Practical Boat Buying book. No doubt about it, this was our boat.

In October, hull #470's owner, Rich Wilder, came to Annapolis for the survey, and if ever we had any reservations about what we were doing, he erased them. Rich was a great support to us as we dealt with grasping the reality of shifting from a 27' to a 37' vessel. The complexities of the boat systems, and her idiosyncrasies, were at first daunting, but then delighting. With hull #470 newly named *Callipygia*, we hauled out for the winter on the edge of the Chesapeake at Herrington Harbor North in Deale, MD. At that time, we still thought living aboard would be 3-years away.

Watching his 65th birthday arrive in November, Bill decided he wanted to retire and devote full time to furthering our dream. Then the prospect of my turning 62 in February, 2001, brought forth my own realization that I could retire now. We could scrape by financially. It slowly dawned on us that there was no real reason to delay. And so we quickly embarked on a series of upgrades to *Callipygia* over the winter - and then faced the challenge of how to prepare ourselves to competently crew her.

An ad in the February edition of Spin Sheet, the Chesapeake Bay monthly, caught my eye. "Nautech Enterprises Sponsors New England Rally." A 600-mile late June cruise from Annapolis to Camden, Maine, by way of Newport, for beginning cruisers. It sounded like just the ticket. We would have time to complete our upgrades, and the security of being in company with some other boats—but, most importantly, it would give us a goal and focus our preparation efforts. We signed up for the Rally and for Nautech's Weather, Offshore Passagemaking, and Offshore First Aid and Safety Equipment seminars.

I wrote this article sitting in *Callipygia*, in September, 2000 - two months after returning from Maine. We had rented our house and moved aboard. We intended to complete our transition to the cruising life in early October by transiting the ICW to the November SSCA Gam in Melbourne, FL, and thereafter head to the Bahamas and points south. I reflected on where we had been only a year previously; mildly shopping for a boat that we might begin cruising in several years hence. Our lives have changed monumentally. I wondered, where on earth did we find the confidence to think we can actually do this—neither of us with much real sailing or cruising experience? We knew a Tayana 37 could take care of us under almost any conditions, but could we take care of her?

Participating in the New England 600 Rally was without doubt the signal event in facilitating our successful transition to the cruising life. Entering the Rally forced us to prioritize our upgrade and maintenance projects to ensure that *Callipygia* would pass the Rally inspections, and to take a hard look at our own capacity as crew. It made us develop concrete plans of how to improve it. The Rally requirement of at least 3 crew, mandated that for this first shakedown trip we would recruit the necessary crew support so we could successfully make the Rally's overnight transits. We were exceedingly fortunate to have Rich Wilder come with us for the Annapolis to Newport leg of the Rally. Participation in Nautech's Offshore Passagemaking Seminar, and subsequent Offshore First Aid and Safety Equipment seminar, at the Maritime Institute of Training and Graduate Studies near Baltimore, ensured that not only did we have a good theoretical understanding of offshore cruising procedures, and put us in touch with numerous resources, but it also gave us actual hands-on experience in handling emergency-at-sea situations.

On reflection, however, the most important aspect of participating in the Rally was the return trip. The Rally got us to Camden safely with sufficient experience under our belt that we should be able to make it back home to the Chesapeake. We were going to have, of necessity, to do this on our own. And that return trip was where we gained the confidence and experience to think we really could become blue-water cruisers. Despite many anxieties before starting the return, we never found ourselves in a situation we couldn't handle. And, in two rough weather situations, we learned what a complete rock the Tayana 37 is. Looking forward out of the cockpit in a blinding thunderstorm, with miserably

uncomfortable seas, *Callipygia*'s broad untrembling deck gave us a most comforting feeling of high confidence in her.

The return trip, with just we two as crew, offered challenges and opportunities to stretch our abilities, practice our theoretical skills, and trust our own competence. It helped that we won the Navigational Excellence Award among the Rally boats. By following the navigation dictums of the Power Squadron and the American Sailing Association rigorously, the Award taught us that our navigational skills were, in fact, quite good. As Bill said, "we may not have known what we were doing, but we always knew where we were." And now, we did think we knew what were doing enough to truly take off! And so we did.

The Cruising Life

We lived aboard for long enough for me to think I gained some idea of what the cruising life is all about. Before we cut the land cord, I'd read many books written by cruisers, and had an intellectual appreciation for how it might be. I'd also done some camping, and knew how that was. But... each cruiser's perspective is so dependent on personality and expectations that the subjective emotional encounter with a permanent cruising lifestyle has to come first hand. Descriptions are rarely found in ink. Here's how I found it - recognizing it was spread over only 4 years, 7,000 nautical miles, 18 countries, and nearly all in warm climates. In a nutshell, it was not easy, and in many ways much different than I imagined.

1. Moving Aboard

A description of how we made the transition from wannabe cruisers to liveaboards is found in the "Shakedown Cruise" article. There you can find out where the cruising dream came from, how we chose *Callipygia*, and how we got ready for offshore cruising, and finally set off.

Once we made the decision to cut loose, initially it was very hard to think about getting rid of most of our belongings - of which we had a lot, a complete big houseful. At first, I wanted to put it all in storage so that we'd still be able to go back and have our house exactly the way it had been. But, quickly, it was obvious that was going to be very expensive, and the chances were we wouldn't go back to the same house even if we rented it while we were gone. So I bit the bullet and we gave some paintings and our musical instruments to friends to "babysit", boxed up some books and kitchenware, gave what we could to friends and family, and put the rest in an estate sale.

It turned out to be quite a relief to be stuff-free - except for what we needed for the boat. It was a bit like settling our estate, because as well as getting rid of our stuff, we had to put all our finances and papers in order, redo our wills, and make sure our kids had instructions of what to do if.... It was a lot of effort, but we had simplified our lives - and unburdened ourselves hugely in the process. The simplicity is a major part of the attraction of the cruising life for me.

As the time approached to move aboard, and then leave the dock to sally forth into the wide blue yonder, there were lists of details to be taken care of, and goodbyes to be said. We held an "Open Boat" one Sunday afternoon, and invited friends to come see us "At Home" in our marina slip. We ate goodbye dinners, and hugged a lot. Since initially our plans were small, to go first to Florida, then the Bahamas, and fly back home after 6 months, we eased our way out without cutting all our roots. Since then, we went home for a few months during each hurricane season - I had no desire to cut all my ties. I did that once, 40 years ago when I emigrated from Scotland. Couldn't do it again.

2. Daily Routine

We developed some routines, one for being at anchor (the majority of time), one for underway, and one for those rarer times in a marina or on the hard. I experienced the same

difficulty I faced as a new parent here, because as soon as we got settled into a routine, then things changed and we moved on. So it was constant adjustment, within a general framework of a few routines. Our cruising statistics show how our time was divided between anchoring, passage-making, etc. And, please note that our experience was only in the US summer or the Caribbean—all warm weather climates.

Typical Day At Anchor. Get up early (5am or earlier) and I check e-mail over the radio while Bill makes coffee—2 mugs, plus a thermos for refills. Then up into the cockpit with our coffee, to enjoy the dawn. Around 6:30am I log the weather conditions and begin a couple of hours of listening to/checking in on radio nets. While this is going on I may update the Ships Log for the web site, work on an essay, do some paperwork if the mail recently arrived, read some cruising guides/pilots for navigation advice related to passages we're planning. Bill is a breakfast person so he cooks breakfast—which I sometimes eat, or else I have something small like a banana or orange. Around 9:00am, I like to start working on some boat chores, and keep that up for a couple of hours. Sometimes, however, this doesn't happen and we do a lot of nothing—then I get really fed up because the boat starts to look tacky. I find I'm not willing to work on the boat by myself, and if Bill isn't in the mood for doing anything, then I lapse into doing nothing too—and that's when I get the most fed up with this lifestyle. At some point during the day we check the boat is OK (batteries, bilges, ground tackle), and get in the dinghy and go ashore - to explore, shower (where possible), provision, do errands, go on the Internet, maybe eat lunch out. Along the way we may stop by another boat or so, to say hello or just be sociable. The lovely drop-in habit that has mostly died ashore is alive and kicking among cruisers, which makes it easy to meet people. Back to the boat in the afternoon, to nap or read, or otherwise relax. At some point we run the engine for an hour to charge the batteries and refrigerator as needed. I'll swim (when possible), shower, or take a bucket bath—or just skip it. Sometimes entertain or visit with people from another boat for a light Happy Hour around 4pm. Sit in the cockpit again to watch the sunset. Play cribbage, read, play music, talk for a while, brush teeth, and I go to bed usually around 8pm. Bill usually stays up longer. Some days we work on boat issues for most of the day, and then take a day or two "off". Or we may play tourist by renting a car, bikes, or take the bus to get farther afield than we can walk. A few times I've found an opportunity to volunteer to help a local project or group - I'd like to do more of that. If we're at the same anchor spot for more than a couple of weeks, I begin to feel trapped—antsy to be able to walk when I feel like it, or move on. A boat version of cabin fever.

Marinas. It's hard to do major boat projects at anchor, because for some you need a lot of fresh water, or power, and you can't remove or service the ground tackle, fold the sails, or do certain engine work. Sometimes it's quite roly at anchor, and hard to work below. And, it's hard to get motivated when you can sit in the cockpit and admire the view, go for a swim, or otherwise laze around. So when the todo list gets long, or we know we have to wait around for some reason (visitors usually, occasionally weather, or sometimes a part of equipment) we go into a marina for a while where it's easier to get serious about boat work. The daily rate often drops dramatically if you stay more than a week. Lately, we've gone into a marina like this once or twice a year. Marinas have showers, water and electricity are on the dock, and we can stretch our legs whenever we want. Marina life is a bit noisier, less private, and the ambience in the cockpit at dawn and dusk isn't nearly so

appealing as at anchor. There's no swimming. It also costs money, and there are usually money-seeking traps (restaurants, stores, markets) nearby. But from time to time it's a nice break, and it's very nice to have showers at will, flush toilets, and get power without having to crank up the engine. It's also wonderful to be able to go for a walk when you feel like it, or do the morning exercises on a large stable surface. In a marina, I let go of the morning email and radio net routine, instead checking weather and email on the Internet every other day. If there's any possibility of adverse weather, however, I still listen to forecasts on the radio once or more each day. You can get seriously hammered in a marina by high winds - that happened to us in Marsh Harbour in the Bahamas. Mostly I keep my nose to the grindstone on boat projects while we're in a marina, unless we have guests. Usually I enjoy it, and get a lot of satisfaction from the work, especially when we conquer a thorny problem that's been hanging around for a while.

Passages. Our many offshore passages each lasted not more than a couple of nights where you can't really get into much of a routine. Our one ocean passage lasted 9 days, but things didn't change much. Mostly passage-making means taking turns on watch, getting food ready, or napping/ resting, and that's about it. For our single overnights, we made sandwiches or other hand food ahead of time, filled thermoses with hot water, and stowed everything tight - on deck and below. We used a departure checklist to remind us of what we had to do. Underway, whoever's on watch fills out the log, and keeps a lookout - for traffic, fishpots, and other hazards. Obviously, we keep a close eye on where we are so we don't drift onto a reef. If we're offshore and doing an overnight, the off watch usually goes below and tries to sleep. If we're motor-sailing, we turn the radar on. If we're not, we turn it on if we need to for ship crossings, or squalls. When he's off watch, Bill does pretty well at falling asleep easily, but I mostly can't so usually the best I can do is rest and doze a bit. I'm constantly aware of the boat and on alert for changes in motion, wind, or engine noise.

Home Visits. We were fortunate to be able to leave the boat for 2-3 months each year and make an annual Home Visit. It's a big job to get the boat ready to be left, and to settle in after our return. But it is wonderful to have serious quality time with our kids/grandkids, siblings, and dearest friends. Because we try to charge as much as possible on our credit cards, we've accumulated a fair number of airline miles--so we've been able to afford a lot of flying around. Our Home Visit helped us notice the contrasts with our cruising life, and reminded us of what it would be like if we decided to swallow the hook and move back ashore. On the Home Visit, I volunteered for a week or two at the place where I last worked (Covenant House). I wanted make a contribution as best I can to a worthy cause, to keep in touch, and be reminded what it's like to have a regular job and to commute. Other than that, so far my major Home Visit projects have been first to create, then upgrade, this website.

It sounds like one grand vacation--and sometimes it felt like it. But mostly it was like a lot of hard work interspersed with being a tourist and/or being bored. But there were those wonderful times sitting in the cockpit, breezing along under full sail at 7 knots, or watching the dawn and dusk at anchor. Sometimes I got tired of the work, or being a tourist, and I never liked being bored. When I got in a slump (usually never for more than a day or maybe two), I asked myself why keep on doing it? A good question--but increasingly

the answer was, because I can't think of any other way I'd rather live. So shut up, and quitter bitchin Pat.

What I most missed from my shore life were a few of the daily rituals (getting up early and doing laps in the pool or running, regular workouts and exercises, a yoga class, seeing and/or entertaining friends regularly, and talking on the phone to kids/grandkids). I missed being able to walk out the door at will. I missed the garden's dirt, and watching plants grow day by day. I didn't miss having a car, traffic, television, newspapers, telephones, house cleaning (not much different from boat cleaning), shopping, bulk mail, cutting grass, shoveling snow, or a "9-5" job. We are very lucky to have enough retirement income that we don't have to worry all the time about money. We are truly blessed to be able to live this way.

3. Emotions and Spirituality

The emotional impact of a taking up a cruising lifestyle has been huge for me. This is one of my most major life adjustments—as big a change as getting married, emigrating, divorcing, or having kids. Naturally, my emotions reflect my personality. Probably the biggest difference in my emotional life is that I am much more confronted by - hence more aware of - my feelings than before I took up cruising. I notice and think about them - and now I do better at owning them rather than them owning me.

In some ways, the cruising life was, for me, one big emotional movie—with highs and lows, and not much in between. (Or is that just life, dum dum?) I got great pleasure in living so closely in touch with nature. I had many fears and anxieties associated with being so much under control of nature's hand. I constantly struggled to figure out "Why am I doing this—in the grand scheme of things, what is my purpose?" It was a battle to keep motivated and maintain a healthy exercise, eating, and hygiene routine. Most of the time I had to be alert and pay attention to my intuition, and listen to the boat. And more than a few times, this saved us from serious trouble. I got anxious and tense before every passage, and worried about what might go wrong and whether we'd be able to cope with emergencies. My body was always poised to move into "fight or flight". I sometimes got frustrated because I couldn't do or have what I wanted - so I had to adjust my attitude, and let go. I got exhilarated when we're sailing along in a good breeze at a good speed, or dolphins came say hello, or a new kind of bird went by, or fish swam under us at anchor, or I could see a million stars at night because there were no shore lights. I got really bored when it was so hot I lost my motivation to do anything. I felt proud of my level of competence/knowledge regarding boat matters, and the skills I acquired since we moved aboard

Moving around from place to place, and living essentially in the open, my awareness ripened to help me see what life is like for people in different cultures and who have access to a different set and level of resources. I found myself in places where people didn't understand what I said, and where I didn't know how to get from A to B. I knew what it felt like to be a foreigner, and saw what it's like to live in a third world, with little in the way of security or material possessions. I learned how few people have what I as a middle class American took for granted. I learned how myopic, short-sighted, and chauvinistic is the general viewpoint of world affairs from the US.

I had time to sit in the cockpit, and just be. I was in complete awe of the beauty and vastness of each day's dawn and dusk, the miracle of the sun's regularity. I noticed and had time to reflect on the simple state of being alive. I realized that what I take for granted is not my due but rather a fortunate happenstance of birth. The earth owes me nothing but the opportunity to live briefly off its bounty, and to pass my genes and my values on to another generation. I see how we humans invent our own reality, but that is all it is—an invention. We constantly seek meaning. We make it up for ourselves—and then fool ourselves into thinking what we've made up is real. We think we can control what happens to us—but the truth is, it is all a mirage. Not much is certain, or can be predicted. We are born, we live briefly, we procreate, and we die. We are no different from anything else. If we're lucky, we are comfortable for most of our brief lifetime. The thing we have most to fear is human behavior—we kill, rob, and terrorize each other with frightening intensity. We ravage the environment, and are oblivious to the suffering of most of our species—and of other species. We ignore the lessons of history, and keep on making the same mistakes, over and over.

Living on a sailboat, I was confronted immediately (or at least soon) with the consequences of my actions. If I didn't pay attention to maintenance, weather, navigation, etc., bad things could happen. I couldn't hide from all the garbage I produced—no one came to take it away. I had to find an appropriate place to dispose of it, or else it will sully the boat, the water, and the land we walk on. When I shit and pumped out the head, if I looked overboard I could see the detritus I produced minced up and floating on the water. No-one is hiding or treating it. There is a very limited supply of water and electricity, and we had to do something (with mostly a lot of effort) to produce the minimal supply that we had. Tomorrow shows up with incredible regularity. Except when docked in a marina, I had always to stay partly on alert. When I slept, I kept half an ear open. I had to notice what's happening with the weather, on the water, with the boat. If I didn't we might sink, drag anchor, be hit by another boat, or boarded by an impoverished and desperate local who saw us as incredibly wealthy. I noticed small noises, and changes in noise levels. If I woke at night, and something seems different—my sailor's intuition drove me out of bed to check—on the wind, the anchor, the bilges, the rigging, the dinghy, the distant beach music. Every noise and odor has a source, and an implication, it must be tracked down. This is how primitive man lived—somewhat. I am more in touch with my roots. I know that I will die, and I'm ready for when it happens. I want to be alert and notice it happening, but I don't want to suffer unduly. I'm aware of how much I love Bill, my kids, my grandkids, and my far-away brother. I feel a rush of affection and wonder every time I see a child.

In my landlife, on the other hand, I ignored the obvious consequences of the way I lived, and blindly assumed they would be taken care of (by whom?)—to what I see now as our now obvious collective peril. Even so, sometimes I longed to be back home (wherever that may be) in my comfortable middle class life, and able to relax in my old life of privilege, oblivious to the fruits of my way of living.

4. Social Life

Social life is much different than on shore. Living on land (even though I moved several times), working at a regular job, going to the same stores, doctors, service

providers, I got to know some neighbors and colleagues, made friends - some close - and was well acquainted with any number of people. My social interactions were plenty and frequent - according to the amount of effort I put into meeting my social needs. In the cruising lifestyle, however, the people around us were constantly changing. It's easy to meet people, cruisers are a friendly lot. On shore, too, most locals are welcoming. But since we rarely stayed in the same place more than a few weeks, and normally traveled on our own, we had a gazillion acquaintances and very few real friends. We found a very small handful of other boaters with whom we shared common interests and values, and consider friends. We saw them from time to time, if we both happened to be in the same place at the same time. But it's an itinerant lifestyle, and demands self-sufficiency. Some cruisers stay months in the same place, party together frequently, develop group routines (dominos, beach games). We were more introverted, and didn't do that. We did share an occasional afternoon Happy Hour with cruisers we met, and we made an effort to meet some new people at every stop. But that's about it.

Sometimes it got lonely, just the two of us, and often we missed our friends and family. Email was a godsend, and our morning routine to collect email via the short-wave radio on rising set a tone for the day. If we had no messages, it was a bit of a downer. Two days in a row, and we were sure everyone had forgotten us. Or we were up because we had half a dozen, and felt good that we were being remembered. I created this web site so our friends and family would know how/where we were - but we had no equivalent vehicle to find out about them, other than the emails they sent. Occasionally we were somewhere that we could "phone home" from, but those chances were infrequent - and no-one could call us back, if we missed them.

Occasionally we had friends or family visit us on board, which was a treat. Then there was real quality time together, and it's fun to watch them be intrigued with the boat and our lifestyle. Those times were pretty rare, but when they come they were rich and packed with connecting. We treasured them.

Radio nets turned out to be an important social support. I'm glad I struggled to get my ham license, and became a dedicated listener and checker-in on some of the ham nets (some would say I was radioactive). Over time, I got warm fuzzies from knowing (by voice) the net control, and having my call sign bring forth recognition of my name. I loved it when I could talk on the radio to one of our faraway boatfriends. We listened to the news from all over the world, and in some measure kept up with what's happening - although often with a different spin than CNN gave. We spent more on our radio equipment than we budgeted, but it was worth every penny.

5. Relationship

In a small space where two people are together 24/7, the relationship between them is crucial. The cruising life founders on the same things as land life: relationships and money. Here's how I see our interaction-Bill may see it differently, but he's read this and I gave him the opportunity to add/change what I've written, so I assume he concurs.

We get along rather well, I think, only rarely getting into a real conflict. I tend to be proactive, initiating things, practicing "what if's", and focusing on prevention-I'm also

pretty assertive. Bill tends to be more passive, and sometimes prefers to wait and see what happens. Bill does much better with open time than I do and doesn't get as bothered as me when the boat gets a bit messy or dirty. I get very bored and frustrated if I don't have a project to work on, or when the boat's a mess - whereas Bill has a healthy indifference to minor disorder and dirt, and seems to be OK relaxing by reading novels or playing solitaire.

There seem to be two primary places where we get into trouble. One is over some boat issue where I give Bill direction or override his opinion and then he feels put down. The other is when I want to take a precaution that Bill feels is unnecessary. Because I'm the one with more sailing and boating expertise, I am the captain regarding boat matters. Bill is the captain when we step onto land and deal with port, customs, immigration, or marina officials. We work on our relationship, recognizing and appreciating each other's strengths, and recognizing the importance of having a designated captain when its needed. I work on being sensitive about how I step in and out of my boat captain role. We've improved our ability to be accepting of each others differences. We discuss these, often with humor, and help each other learn about ourselves with (mostly) sensitive feedback. We are interested in many of the same things, and share the same philosophy and values. We are very companionable in our philosophical discussions, joking about life, playing cribbage, sometimes making music, guitar and/or recorder, and we generally give each other good emotional support and learn a lot from each other. For the most part we're able to have the space we need and it is rare that one feels the need to get away from the other. Our relationship is based more on loving friendship than hormones, though it's nice when they erupt. We get upset with each other on occasion, but we're rarely at odds for more than a few moments.

Life on a boat forces you to confront yourself and deal with yourself. There's no where else to go. You have the time to observe and reflect on your own behavior and feelings about life and from your relationship, and hopefully to learn from that reflection. In spite of preferring to be a "doer", I still have plenty of downtime (usually more than I want)-especially in the hot and humid climate we experienced. If something is bothering me, I've learned by now that it's my problem and I need to adjust my attitude and/or talk it through together.

6. Boat Work

Learning all one needs to know to cruise successfully requires full time study and application. It's like being in graduate school. While living aboard I was a serious student of weather, navigation, radio, radar, web site development - and Spanish - not to mention seamanship, sailing theory, engines, electrical matters, fibreglass care and construction, rigging, knots and splicing, plumbing, ground tackle, astronomy, history, birds, and and philosophy. I read and re-read textbooks on these matters. I wrote about what I learned. I had fun applying my knowledge on the boat and on our passages. I learned to snorkel, and took an introductory scuba diving course. There's no end to what I could learn - good thing, because that's my primary hobby - learning new stuff.

Care of the boat (Bill calls it the tyranny of maintenance) dominated our lives. I'm cautious by nature, and focus on preventive maintenance - I dread emergencies (although practicing - at least mentally - what to do if.....) I keep on top of the maintenance schedule,

and badger Bill if he gets behind. The engine and plumbing need regular (usually inconvenient) attention. Keeping the boat clean and bright takes a lot of work. Constant attention to rust spots on the deck metal, and touching up the deck woodwork. Scrubbing the deck. Scrubbing the cockpit. Daily checks of the rigging, the ground tackle. Polishing my observation skills so as to notice something that needs attention before it becomes a problem. Below, its a battle between order and chaos. Such a small space, only a few things out of their stowage space, and the place gets overwhelmed. Working on projects means tearing everything up below for a while, then putting it back in order. Stowage is a big deal. Sweet *Callipygia* had terrific stowage space - which we filled. Maintaining the inventory of what's stowed where is work, but essential. Even after 4 years, I can remember a lot of what was where, but other things - rarely used - I turned to the list. Pulling something out means unpacking a locker, lifting up the bed or seat cushions, crawling into the engine room, and moving everything out that's in front of the item I want. Then putting it all back together - and updating the inventory if I moved stuff around. Takes 30 minutes to get the tools to do a 5-minute job sometimes. Then another 30 minutes to put it away. Seems like.

We made a reasonable division of labor as follows. We take days about being responsible for meals, and whoever cooks also cleans up. That means we each get alternate days off - this is really important to me. On many boats, the female is a galley slave. Bill takes the lead in care of the engine, electrical stuff, the dinghy and outboard, and the plumbing. He goes up the mast. On those matters I help and consult as needed. We share the work of caring for the sails, rigging, and bottom. We both do passage planning and navigation. I have the lead for deck metal/teak care, cleaning cockpit, deck, topsides, and housework below, including laundry. I take the lead for the weather and radio stuff, safety equipment, health matters, and maintain the lists, order the charts, cruising guides, boat supplies, etc. that we're going to need, and organize the provisioning. I keep on top of the stowage, deal with paperwork and taxes, and make sure the bills are paid. For all of these I get help and advice from Bill as needed. We consult about what we're doing all the time - how can you not in such a small space? Mostly it works out just fine. It's a full time job some of the time - so much for this permanent vacation stuff!

7. Comfort

Before we went cruising I took bodily comfort for granted—and never even noticed that I was doing so. Cool sheets stayed tight on the mattress. I could shower whenever I wanted, or use the toilet at will—always with an ample supply of soft toilet paper. I had a climate-controlled house, workspace, and car to keep me comfortable regardless of the outside temperature. I turned knobs, switches, and other gadgets to produce whatever cooking conveniences, laundering or other comforts I desired. I could take an endless hot shower if I felt like it - or even a hot bath. I stored an abundance of food and drink in a large refrigerator. A flush toilet was near wherever I went. Shops abounded with all the foodstuffs, clothing, hardware, and footwear I needed or wanted, and my wallet provided the wherewithall to buy them. When I felt sick, I could buy whatever medications I thought I needed—or go to whichever doctor I wanted. My insurance took care of it all.

Bodily comfort on a boat is a different matter. Often I was hot and sweaty (we spent most of our time in the tropics) and I had to either take a water-conscious shower on deck

(after a swim if I'm lucky) or a bucket bath to keep clean. I sweated in bed at night. On passage or in a roly anchorage there's so much boat motion, I often couldn't sleep. Sometimes there was annoying shore noise - loud beach music until dawn. I sweated during the day, and someday, it was so hot everything took effort. I worried about where I'm going to get the laundry done—and dried. I watched for signs of mould on the ceiling liner. I wiped mildew off our books. On land, I carried toilet paper to use in paperless public or marina toilets. I couldn't go for a walk whenever I feel like it, so I got stiff. Our small refrigerator maintained (mostly) a temperature of 50 degrees C, and ice cream was a distant memory. If I wasn't careful, our dry food got infested with weevils, or worse, cockroaches. If I forgot to take some Bonine (meclizine hydrochloride) before a passage, sometimes I got seasick. If I was ill, I had to self treat and/or self medicate. Underway or at anchor, I had to be alert, available, and rational, and able to respond to a boat emergency regardless of how bad I felt. Everything took three times longer to do than I think it should have. Everything I was looking for was stored behind 6 other things, in a locker under the mattress, or some other hard-to-get-at place. It would be easy to slide into escape from boredom and discomfort with booze, which beckons many a cruiser.

On the other hand, all I wore was comfortable shorts and a shirt, and I went barefoot much of the time. I didn't need a bra. Our homey cabin and cockpit were as comfortable and snug as we could make them, and our cozy V-berth - though a bit narrow - was the firmest and at the same time softest bed I'd ever slept on. We invested in custom-fitted sheets, and bought comfy seats for the cockpit. In many an anchorage, I could climb down the swim ladder and do laps round the boat in the cool sea water. Sometimes I could see fish below me. Often, sweet wavelets lapped against the hull by my ear in bed, or I could hear the crackling nibble noises of krill munching on hull growth. I wakened to the cawking of the green heron. The gentle hum of wind in the rigging or the tree frogs lulled me to sleep. The groaning of the snubber line wakened me when the wind got up. The views that passed by my eyes were marvellous. I laughed a lot, as we rejoiced in the ridiculous and ludicrous things we do and see. I didn't have to do anything - right now - except respond to the needs of our beautiful boat. So my spiritual comfort is great. I was one with the great unknown, with every man/woman/child, mammal, bird, fish, reptile, plant, wave, rock, star – but most of all with Bill and sweet *Callipygia*. We three together, we were a team, floating up and down in our corner of this awesome universe.

8. Leisure Time

In spite of cruising around, and doing boat chores, we still had a lot of leisure time. More than on land, because we're not on a schedule. There were no more Monday mornings, or thank God it's Fridays, or hump days (Wednesdays). I spent my leisure time writing, reading, sightseeing/playing tourist, playing cribbage with Bill, tootling on the recorder, snorkeling/swimming. Or learning Spanish, or just sitting, listening to and looking at this wonderful natural environment. Or napping. Or doing research on a topic of interest. It was hard to beat (except for those times when I was really hot and bored).

9. Business Matters

Business activities were fairly minimal. We had a mailing agent in Florida, where all our mail went. They weeded out the bulk mail and held it for us until we told them where to send it. Usually to a visitor coming from the US to stay on the boat, occasionally to a marina - though that got expensive. We did much of our boatwork ourselves, and got better and more efficient at it. Nonetheless, we were fortunate to be able to pump some of our income into various local economies - getting work done that we didn't know how, didn't have the time, or plain didn't want to do. We patronized local businesses, especially in poorer countries. We often ate lunch out, preferring local food. We almost never ate dinner out, or went to the more expensive tourist restaurants. We didn't frequent local bars to socialize or buy expensive drinks. We shopped local markets for inexpensive produce, groceries, or wine. We took buses to get around or walk, only rarely renting a car. We tried to spread out major boat expenses, preferring repair to replacement, though we didn't scrimp on safety equipment.

We got our mail about every 6 weeks on average. Opening it and going through it was an event, and sometimes there's something that needed follow up - which could be hugely frustrating with interminable and expensive attempts to make telephone connections through the maze of some customer service system. Our retirement income is adequate for our needs, and is direct deposited. We managed our finances via the Internet - checking and paying credit cards, paying other bills, doing tax returns, and tracking retirement fund and bank balances. There were ATMs that spit out local currency almost everywhere we went. Internet cafes were commonplace. How different it must have been a decade ago - because of these technological developments, we didn't have to burden our kids with doing our business stuff for us.

People ask, how much does it cost to do liveaboard cruising? The answer is: everything you've got. We have younger friends who got by on much less than us - they had no retirement income, only whatever they've been able to save. They do all their own boat work, take occasional jobs to prime their kitty, eat out infrequently, and shop carefully for best buys. We have met others, on bigger boats, with more expensive equipment, who eat out all the time, rent cars, and who are wealthy compared to us. While we didn't feel at all flush, we knew that we too were wealthy compared to many. We are very fortunate not to have to worry about money too much.

10. Safety and Security

Safety on the boat is the primary concern - if something goes wrong, it could be life-threatening. So we dealt with that by equipping the boat with recommended safety equipment, and learning and exercising seamanship skills. We exercised the normal cautions given to tourists travelling in foreign countries, or as we would in urban areas in the US. On the boat, we were probably a lot safer than crossing a city street, driving on a congested highway, or flying on a plane.

We listened, regularly, to the Caribbean Safety and Security Net (8104 USB at 0815 hours) during which security incidents were reported. The Net has a website where it collects and reports incidents by country. Incidents typically had to do with outboard

motor theft, but there were the occasional boardings/break ins. We exercised recommended cautions when in high risk anchorages, and regardless of where we were, always locked up the boat when we went ashore - which we seldom did after dark. We always showed an anchor light at night. We had no more safety or security concerns than we did when we lived in a house.

11. Swallowing the Hook

Our decision to do this came on us quickly and unexpectedly, but as the days wore on it became more and more clearly the best thing to do. We should have realized before we headed for Bermuda in May, 2004, that we were not ready for an Atlantic crossing - but the idea and excitement of it had taken over. We loved the planning and anticipation. But during the first leg of the Atlantic Crossing (see Ship's Log of events on the 9-day passage from St. Martin to Bermuda) I slipped and fell, splitting my head open on the 2nd day out. When this happened, we realized that without the other, neither of us would be able to carry on safely by him/herself. I had the knowledge but not the physical strength to deal with problems, Bill had the strength but not the know-how. Thus, it didn't make sense to continue the crossing as planned because (a) we would clearly be in difficulty if serious heavy weather showed up or we had major equipment failure, and (b) neither of us enjoyed the slogging ocean passage to Bermuda that much and we lost our desire to repeat it. Those fair winds and following seas seemed like a snare and a delusion! As we neared the end of that passage, and once arrived in Bermuda, we thought about what we enjoyed and disliked about the cruising lifestyle. We realized that, at our age and with our experience, the benefits were beginning to be outweighed by the drawbacks. We had accomplished a lot in the nearly 4 years we owned *Callipygia* - 7,500 miles and 18 countries, including coastal, offshore, and ocean sailing. But the price in inconvenience, effort, discomfort, distance from our dear ones, and lack of exercise, had become greater than the many pleasures we realized from cruising. We wished we had been able to get going when we were younger.

We thought that we could continue finding most of the pleasures, with fewer miseries, by land cruising. We loved hiking and canoeing, seeing and being in the outdoors, visiting new places and meeting new people. We like living in something small, compact, and fairly modest. And so, we decided that time had come to "swallow the hook" and that we would move into a small but comfortable RV.

There is still many a moment when I miss sweet *Callipygia* dreadfully and seriously wish we were back cruising. I don't think Bill shares my feelings; since he is my numero uno, I just have to enjoy my cruising memories, swallow my nostalgia, and notice and enjoy the ease of living on Clemmie.

[First written in January, 2004, amended September, 2004]

Chapter 3 – The “How To’s”

Cruising styles vary from boat to boat, and from crew to crew--just as with individuals. There is no "one size fits all" aspect to any part of the cruising life. Nonetheless, in the interests of sharing what worked for us, here is how we "did" many of the common aspects of daily life on a sailboat. Initially, we picked the brains of others as to "how to" do many of these things, and we owe a huge debt of thanks to untold other sailors, cruisers, and authors for sharing their ideas.

We endeavored to follow what seemed to be the "Best Practices" that had evolved in the cruising community over the years. While we had our struggles, we tried to be cognizant of the dangers of cruising and strove for prevention over cure and generally erred on the side of caution. Our goal was to enjoy ourselves, yet be safe and not have to worry too much about “What If.” We had many adventures, a great deal of enjoyment, and a few bad experiences - thankfully nothing was fatal.

This Chapter documents our general SOPs (Standard Operating Procedures) for the tasks and activities listed below. Our procedures for navigation, using the radio and radar, and tracking weather are included separately under the relevant chapter.

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1. Anchoring
2. Anchor Watch
3. Boat Notes
4. Book of Lists
5. Defect Book
6. Departure Checklist
7. The Dinghy
8. Engine Log
9. Equipment Instructions
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11. Hurricane Preparation

- 12. Inventory
- 13. Landfall Checklist
- 14. Maintenance Schedule and Log
- 15. The "Office"
- 16. Owner's Manual
- 17. Waste Management Plan
- 18. Whisker Pole
- 19. Wind Vane

Anchoring and Anchorages

Learning how to anchor and choose an anchorage, and within it a spot to anchor, was among the most important activities we did while we were cruising. We spent over 80% of our time in harbor, mostly at anchor (occasionally on a mooring ball, and rarely in a slip.) Thus, our ground tackle was (after engine and rigging) our most important equipment. We came to feel very comfortable anchoring, and being at anchor. Anchoring is as much art than science, and here's what we learned.

Our anchoring bible was [The Complete Book of Anchoring and Mooring](#) by Earl Hintz, supplemented by a few other books. Our primary bow anchor was a 35lb Delta, with 160' of 3/8" BBB chain spliced to 175' of 5/8" 3-strand nylon - we never felt the need to have an over-sized primary anchor, since the weight of chain (over 200lbs if all of it is out) provides sufficient weight on the bottom. Our secondary bow anchor was a 35lb CQR with 40' of 3/16" chain spliced to 220' of 5/8" 3-strand nylon. Our stern anchor was a 22lb Danforth, with 10' of 3/8" chain attached to 175' of 1/2" braided nylon. We also carried an oversized Fortress (21 lb) with 40' of 3/8" chain and 300' of 5/8" 3-strand nylon for storm conditions, assuming sand or mud in the Caribbean. We also carried a ParaTech sea anchor for riding to in storm conditions.

We routinely used a bridle made of two 35' 5/8" 3-strand nylon lines with rubber stretchers, shackled to a chain hook, as a chain snubber on our primary anchor.

We had a Simpson Lawrence manual windlass, that we greased approximately monthly. A manual windlass was one of the 50 attributes we were looking for when we were shopping for a blue water cruiser. While an electric windlass is certainly a nice convenience, our reading (and experience from other boats) led us to believe that an electric windlass sucks up electricity and will eventually fail - inevitably at crucial moments. Soon after we first anchored in Luperon, Dominican Republic, we barely missed getting sideswiped by a big boat trying to anchor near us, whose electric windlass had jammed. So we (i.e. Bill) cranked away.

1. Picking an Anchorage

Here are the points we considered when choosing an anchorage:

- How long do we plan to be here?
- What are the forecast weather conditions for the period of our stay here?
- If adverse weather were to make this anchorage untenable, can we leave easily and is there a safe alternative anchorage we could get to? Have we written down the compass course and GPS waypoints for getting safely out of this anchorage and into the other one?
- How well is the entrance and anchorage area charted and/or marked?
- What kind of light is needed to safely pick a way through any shoals?

- What kind of hazards are there inside the anchorage (changing currents, rocks/coral heads, shoals, fishing nets/boats, ferries/freighters, mooring balls, crab pots, cables, bottom chains?)
- How good is the holding?
- Are there any local weather (wind) conditions or exposure to swells that could make it too rolly, or possibly dangerous?
- How crowded, noisy, dirty, or smelly is it?
- How deep is it?
- What is the tidal range?
- How pretty is it when we sit in the cockpit enjoying the dawn and the dusk?
- How long a dinghy ride is it to shore?
- Is there a decent place to dock the dinghy?
- What amenities/attractions are available on shore?

2. Laying the Anchor

Once we'd picked an anchorage to stay in, here's how we went about picking a spot and laying the anchor. We preferred to pick a spot when the prevailing wind was in effect, so that other boats were lying behind their anchors. That way we could avoid crossing our anchor rode over someone else's (which would mean they could pull ours out when they departed). In the event it was flat calm, or the wind blowing from a different direction, then we had to evaluate where our spot would put us once the boats already anchored move around. If we had to anchor in a calm, we try to set the anchor towards the direction of the prevailing wind.

1. On approach, bring the dinghy up tight behind (if towing it), then start the engine and drop sails.
2. From the chart and viewing from a distance, pick a general area to drop the hook in.
3. One person goes forward, wearing headphones for ease of communicating with the other at the helm.
4. Prepare the anchor and initial amount of chain ready for dropping.
5. Circle around the area, checking how other boats are anchored and lying, watching the depth sounder. Watch the color of the bottom (if possible) and look for sandy spots. Avoid places where the bottom slopes downhill.
6. Pick a spot just behind or off the quarter of another boat and calculate the scope needed according to water depth, state of tide, and weather.
7. Go slowly towards the spot, headed into the wind, so that all way is off as we reach the spot.

8. Slowly drop the anchor and lay it on the bottom, then as the boat drifts back gradually release an additional amount of chain 2-3 times the water depth. Avoid piling chain on top of the anchor. Let the boat drift back in the wind. (Callipygia always turned side to the wind at this point, which was sometimes disconcerting to other boats, but that's how she did it.)
9. Patiently wait and watch her drift back and then slowly turn nose to the wind, telling us that the anchor is holding. Talk to her. If this doesn't happen, assume we're dragging and start hauling in the chain. If that brings her round, then the hook has bitten and we can continue anchoring. If not, then haul up anchor and begin again.
10. Once the bow comes round into the wind let out more rode to reach the desired scope, and repeat the previous step. For all chain in calm conditions with adequate room we do about 4:1 scope (considering depth, plus tide, plus 4' for the boat's freeboard). We put out a bit more if it's shallow, a bit less if it's deep or very crowded. We increased the scope if it's very windy or roly. Once we're beyond the chain and into chain and rope, we also increase the scope accordingly.
11. Once the boat headed back with bow into the wind and the anchor rode going straight ahead, gently go into reverse, and gradually increase RPM's a bit for about 10-15 seconds. Watch the rode tighten, and then bounce when the engine goes back into neutral. If in doubt, feel the rode for vibrations (an indication that it is skipping along the bottom). If the bottom is mud, stay at very low RPM's. We don't do a big power set on initial anchoring. We'll do it later once the anchor is dug in or if the weather forecast warrants it. The Delta is a burying anchor and needs to sink in along with some of the chain.
12. Note our position relative to other boats, and landmarks, and take a GPS reading.
13. Once she seems to be secure, turn off the engine. If we have all chain out, put on the snubber to add stretch to the rode and take strain off the windlass. Put chafing gear on the snubber. If we have all chain out plus some line, tie a dockline with a rolling hitch to the rode, and secure it to a deck cleat to take the strain off the windlass. For the next hour, check our position periodically to make sure we're in the same place.

3. At Anchor in Bad Weather

When at anchor we had some standard practices that we followed. Additionally, if the weather deteriorated, we sometimes initiated an anchor watch until conditions improved, as follows:

1. Turn on the boat instruments (if available) and monitor wind direction, wind speed, boat speed, water depth, GPS position, and barometer. Log these every 30 minutes
2. If you think you're dragging anchor, take emergency action

3. Do an all around check every 20-30 minutes to make sure we're not dragging, or endangering/endangered by any of our boat neighbors, and look around for boats that may be dragging in our direction through the anchorage
4. Prepare the dinghy so you can go help a dragging or unoccupied boat if needed
5. Check for chafe on the anchor rode or dock lines periodically, and make sure nothing has come loose on deck
6. Monitor VHF Channel 16
7. If there's heavy rain, after the decks are cleaned open the water tanks to catch it

4. Lessons Learned

Our worst anchoring incident occurred in Scarborough harbor, Tobago, on December 2, 2003 ([see the Ship's Log](#)). We withdrew a bunch of points from the Black Box that night.

Another time we were exhausted by the time we came into a very crowded and deep anchorage and didn't take enough time to circle around to find the best spot. Then, when it came time to leave, we needed a third hand to help haul and stow the anchor rode under power so as not to yank up another boat's anchor.

In anticipation of high winds in roly Prickly Bay, Grendada, in June of 2003 we buoyed the anchor chain ahead of time, attaching our big orange float and a fender to the chain about 20' away from the boat. This added additional stretch to the chain catenary and buffered the boat's motion. It seemed to work well. While many boats in this rather deep anchorage dragged, we stayed put nicely.

We much preferred to be at anchor when in harbor, and got to be pretty good at dropping the hook (we thought.) The lessons we learned were:

- Avoid very constrained or overcrowded anchorages if at all possible
- If we must use such an anchorage, then anchor on the outside edge of it, as far away from shore/piers etc., as possible.
- Always put the snubber on if you have an all chain anchor rode out.
- As soon as we notice that the wind is getting seriously up, get into the cockpit and be ready.
- If at anchor for a while, check the anchor regularly to make sure you're not slowly creeping in the mud.

We sometimes saw other boats have trouble anchoring. They were usually charter boats with crew who hadn't had a lot of practice, or the charter boats had inadequate ground tackle. The most common mistakes we spotted were:

- Throwing tons of chain overboard right on top of the anchor; and
- Doing a big power set before the anchor had a chance to dig into the sand or mud or otherwise find its place on the bottom.

Storm anchoring is described in our hurricane preparation notes.

Anchor Watch

When in harbor, we put someone on anchor watch in bad weather situations. If it was normal bad weather at night, then the watch dozed below in the cabin, checking around every hour or so as seemed appropriate. BBut in storm situations below is the list of his/her duties (day or night) when coming on to an anchor watch until things calm down. They were.]

- Do an immediate visual inspection to see if we're dragging. If we lie at a different angle to the other boats, we probably are, so take immediate corrective action. Check nearby boats regularly to make sure they are not dragging.
- Turn on the GPS and VHF, channel 16. Have the air horn handy.
- Turn on the electronics (depth sounder, wind instruments, and boat speed indicator).
- Turn on the radar, take EBL and Range on two landmarks. Write them down.
- Get some fenders and docklines out to have ready for use.
- Check ground tackle, deck tie downs, sails, and reduce windage as seems necessary.
- Be ready to turn on the engine.
- Plan exit from anchorage, in case it's necessary. (You've previously selected one and written down it's GPS co-ordinates, right?)
- Do frequent eyeball checks on landmarks and surrounding boats by checking their position in relation to us, and to each other.
- Keep an eye on the depth, wind speed and direction, and boat speed indicators. If any of these change, assume dragging anchor. Check GPS position, radar, and our position relative to other boats to refute or confirm. If dragging, alert everyone and act.
- If another boat is dragging towards you be prepared to fend them or render assistance.
- Check anchor rode periodically for chafe, and put hand on it to feel vibrations as a way to assess what's happening on the bottom.

The Boat Notes

When we were cruising on *Callipygia*, I maintained a more-or-less-daily journal in which I recorded pretty much everything that happened, in more-or-less detail. We called this the "Boat Notes." What broke, and how/when it was repaired. Who we got parts or advice from. When we paid the bills, and who we met. How we felt, and wildlife seen. This is where I put all the items we didn't want to forget. Notes of discussions with service people (this saved us \$5,000 once when we got in a dispute), what we ordered and when. I pasted business and boatcards in here, since I could usually remember about what date - or where we were - when we met someone or did something. When we got sick, I put in here the name of the doctor, and what medication was prescribed.

Entries were hand written (small), and when we took things apart I made drawings in here of how things were put together. When we inventoried or measured things, I made notes in the Boat Notes for future reference. I taped small bits of scratch paper in here with scotch tape if we wanted to be able to find what was written on them someday in the future.

I put the day and date in the margin and drew a box round it, so it was easy to find a particular entry when leafing through. When we did a maintenance item, I put an "M" in a circle in the margin, so it was easy to spot if we forget to put it in the maintenance log. If something broke or needed attention I put a big asterisk in the margin, so it was easy to find that if we forget to log it in the defect book. The older we got, the fuzzier our memories became, so we relied on various tools like the Boat Notes to help us to refer back to when, and whether, something happened.

At the back of the book I tried to keep track of daily expenditures, totaling the amount for each day. It's true - if you don't keep a careful eye on your dough.

One college-ruled 100-sheet spiral notebook lasted about a year and we found the Notes to be invaluable on more than one occasion. Once we went RV'ing, I used pretty much the same format for our RV log. Under the date in the margin, however, I also made a note of where we started the day, and where we ended it if we moved somewhere else. In the latter case I also recorded the starting and finishing odometer, and thus the miles traveled.

The Book of Lists

List-making can become a serious habit when you are cruising. To manage this, we kept a "Book of Lists." This was a 3-ring binder that had a set of numbered tabs separating each of the items listed below, with a hand-written table of contents at the front explaining what was behind each tab. This worked well as a filing system for us. Here's what we kept in here:

1. Pages on which had been copied the Boat Emergency Reference Cards (See next Chapter - the "What If's.")
2. Contact information: address lists; copies of boat cards and business cards; cruising rally participant lists; possible crew list; printout of e-mail address book; etc, etc.
3. Flag symbols and meanings; Morse code.
4. Sail combination table, POLARS for the Tayana 37'.
5. Storage placement and diagrams.
6. List and description of all thru hulls, vents, and pumps, with diagram of placement. (*Callipygia* had a *lot* of these.)
7. Tickler list of when registrations, certifications, insurance, etc., etc., expire and need to be renewed.
8. Self survey check-off guide.
9. Detailed long-distance passage departure checklist.
10. Long-distance passage landfall checklist.
11. Useful internet website URLs.
12. Various training course checklists and emergency reference information.
13. List of basic boat "SOPs".

The Defect Book

We got the idea for this from Don Casey's book [This Old Boat](#) which has a great chapter on planning to fix up your old boat.

Our Defect Book was simply a standard ruled notebook with three columns drawn on each page, the middle one being the widest. In it we wrote by hand the date, a description of an item that needs to be done/fixed, and date of completion for each item. The description is where we noted details of what needed attention. A hatch leaks; a light stops working; a winch gets stiff; a gouge is made on the deck; a sail slide sticks; a filter or screen on a hose needs cleaned; etc., etc., etc.

When the item was taken care of a line was drawn through it, the date of completion entered in the right hand column, and an entry was made in the Maintenance Log.

We can't pretend we always got to the items in the Defect Book on a timely basis, and there a few things that were there since the beginning of time. However, it meant we knew we were not attending to something rather than had simply forgotten it.

The Defect Book was kept alongside the Maintenance Log in a lexan wall pocket (purchased from an office supply store) affixed to the bulkhead in the main cabin.

Departure Checklist

We used a departure checklist in preparing for a passage because it's too easy to forget something otherwise. The checklist for an offshore or ocean passage is more comprehensive than for a daysail or an overnight passage offshore. What's listed here, is the ocean passage checklist. We had this, and it's shorter cousin the offshore version, laminated. Then we just checked the items off using a china pencil or erasable marker. Believe me, it's easy to forget something....

1. Prior to Departure Day

- Check thru-hulls, hoses and clamps
- Check compass
- Check rigging and sails
- Service winches
- Change oil, coolant, replace fuel filters and do other check engine maintenance
Check the regular maintenance schedule and do any other overdue items
- Check inventory and buy necessary spare parts, batteries, etc.
- Provision for all non-perishable items
- Do passage planning
- Check electronics
- Check all safety equipment
- Fill propane tanks
- Clean boat bottom
- Track weather to identify window
- Recharge the spotlight
- Refuel
- Fill water tanks
- Do laundry

2. Day Before Departure

- Provision for perishables
- Clear out of customs and immigration
- Take down awnings
- Check navigation lights
- Charge the handheld VHF

- Rig jack lines
- Check deck tie downs
- Review weather forecast
- Do radio checks on VHF and SSB
- Top up fuel and water tanks and jerry jugs
- Haul and stow the dinghy and outboard motor
- Put snap shackles on cockpit locker latches
- Send float plan
- Make up sea berths with sheets and pillows and rig lee cloths
- Stow everything below except what's needed during the passage
- Stow the secondary and stern anchors and cover their chain hawses

3. Departure Day

- Unlock the life raft
- Put valuables in the Ditch Bag
- Review weather forecast
- Fill thermoses with hot water
- Prepare passage food
- Make galley sea-ready
- Take meclizine hydrochloride (Bonine) 1-2 hours prior to departing
- Bring out PFDs and tethers
- Turn on electronics and remove covers
- Unlock the steering
- Uncover the compass
- Check engine oil and coolant (again)
- Check bilges
- Remove sail covers and stow below
- Attach halyards to main and staysail, and sheets to staysail
- Close and secure hatches and portholes
- Reset GPS Trip Odometer
- Check on deck and ensure ends of all lines are secured
- Haul down courtesy flag and prepare Q flag and new courtesy flag
- Bring out Deck Log, charts, and Navigator s Notebook

- Turn on the VHF and put remote in cockpit
- Turn on GPS
- Make departure entry (all except time) in the Deck Log
- Turn on the engine
- Up anchor, unmoor, or leave the dock
- Stow the primary anchor and cover its hawse pipe and the windlass

The Cruising Dinghy

We had some good and some bad times with dinghies. If you're doing anything other than sitting in the dock at a marina, on a cruising sailboat it's practically your most essential piece of gear - one to which we gave little thought when we were wannabe cruisers. In the hope that some of this might be useful for others, here's our experience. After being around a few dinghy disasters (including 2 lives lost) we developed some routine safety and security procedures for us and our dinghy - see Safety Fundamentals in Chapter 1. As with any other boat, seamanship skills are needed on a dinghy.

1. Cruising Dinghy Types

When we bought *Callipygia* she had an 8' inflatable Avon dinghy, and a 4hp 2-stroke Yamaha motor. The dinghy had serious signs of wear, so we put it up for sale through [Bacon Associates in Annapolis](#) and decided to buy a replacement. We did a bit of research, and went to see a demonstration of a PortaBote, a folding dinghy. We decided to buy one, and also the sailing kit that came with it because one of our dreams with a dinghy is to have fun sailing it.

We became disenchanted with the PortaBote fairly quickly - it was very bulky to store, and a pain in the neck to assemble and disassemble. It was also not very stable in the water and couldn't handle more than 2 people comfortably if it was anything other than a flat calm. After a year, the transom had delaminated, the hull had ripped at the grommets, and we were sick of getting soaked if there was the least bit of sea. Despite a lot of practice, the time needed for assembling and disassembling was a lot more than we felt reasonable, and the below deck storage needed for the various parts was too much. This was definitely not a suitable dinghy for serious cruising. So we got rid of it (sadder but wiser) and bought a 10' inflatable ([West Marine](#)/Avon), which we were very happy with in every regard, except that we didn't have room to store it upside down on the deck. Ideally we'd have liked something we could store on deck and launch quickly (without having to inflate), and that we could sail. We had friends who made a two-part fiberglass dinghy (in which we've had fun sailing) which seems close to the ideal. On the other hand, inflatables do have major advantages for stability, load carrying, and comfort.

Note that we've since heard, from the manufacturers of PortaBotes, that improvements have been made to the design and construction of this folding boat, so our comments above may no longer be applicable.

2. Cleaning the Dinghy Bottom

Cleaning the dinghy's bottom is always a chore. We do it every one of the rare times we're in a marina - it's easy to haul it up on the dock, and turn it upside down - on a tarpaulin, if the surface is concrete or anything but wood. Otherwise, if it's bad we take it to the nearest beach, remove all contents, and turn it upside down on the sand. When it's not too bad and we're ready to stow the dinghy, we hoist it amidships from the two dinghy bow attachments using the main halyard, and turn the bottom towards the boat to be cleaned. To clean, we spray the growth on the bottom with a mix of 1 part water :1 part Clorox, let it

sit for about 10 minutes, then scrape the gunk off with a plastic scraper. This gets all the incipient barnacles and plant growth off. Then wash it thoroughly with water, fresh from a hose at the dock, or buckets of seawater otherwise. If it's cleaned on the sand, we have to take care to get all sand out of the inside afterwards, because the grains can chafe and make holes in the fabric.

In the Caribbean, the bottom needs to be cleaned every 3-4 four weeks if the dinghy sits constantly in the water. Some places the growth comes faster than others - look around the shoreline to see what kind of growth is happening. Some cruisers hoist their dinghy out of the water a foot or two on davits a halyard at night to inhibit the growth somewhat. This also makes it harder to steal.

3. Towing the Dinghy

We heard quite a few horror stories from other boats about towing their dinghies. Boats who've lost their outboard motor, or worse their dinghy as well. If you tow in rough seas, and something goes amiss with the dinghy (motor, gas can, seat, oar etc. comes loose, the dinghy fills with water or flips over), it is extremely dangerous to do anything about it. Unless you're willing to risk a MOB, the only option sometimes is to cut it loose. Therefore, we decided that we would always tow the dinghy completely emptied. We took everything, including the seat and the oars out. We had a single davit on *Callipygia's* stern from which we hung a block and tackle to hoist the motor up to its storage spot on the cockpit rail, so it wasn't much work to remove everything. We figured it was worth the effort, given the replacement costs.

For towing, we used a double polypropylene tow rope attached to the dinghy with a bridle. [We made this floating tow rope after wrapping the dinghy line round *Callipygia's* propellor for the second time.....] The bridle went onto the two tow hooks on the front sides of the dinghy with carabiniers, and the two lines were then tied together and brought through a chock on one side of the stern and tied off on a deck cleat. If one line broke, we theorized, then the other remained for insurance. Also, the dinghy rode better to a bridle than a single line. We pulled it up close when we were maneuvering at low speeds to anchor, etc, and let it out about 2 dinghy lengths when we were up to speed. This kept the dinghy in the boat's slick, which minimized its drag (as of course did removing its contents). We think we lost not more than maybe ½ a knot from towing the dinghy.

How did we decide if it was safe to tow? We assessed the sea conditions we were likely to encounter, and the length of the passage. Generally, we towed for short coastal hops during daylight. If we were making an interisland passage, and the conditions were light, we might tow if the trip was reasonably short and all in daylight, although often we took the trouble to stow the dinghy instead. We never towed on an overnight passage.

4. Stowing the Dinghy

We didn't quite have room anywhere on deck to stow our dinghy when inflated. Neither did we have dinghy davits at the stern, because (a) that's where the Monitor windvane was, and (b) it would have been too much windage and weight in the wrong place, and (c) we knew two *Tayana's* who had dinghy davits which eventually cracked.

When offshore, our dinghy was stowed, rolled up in its cover, placed under the boom and tied down at all four corners. We became pretty adept at inflating and deflating it, and launching and hoisting it, and didn't find it too much of a nuisance, especially as we become more comfortable towing it and so had to stow it a bit less frequently. However, there were still a few times when we arrived in an anchorage too tired to deal with it right away.

Often the worst part of stowing the dinghy, is cleaning the bottom first. We had a triangular bridle that clipped onto two padeyes in the dinghy transom, and a ring on its floor near the bow. The three lines come together on a ring that we attach to the main halyard for hoisting and dropping. We had a bow and stern painter permanently attached to the dinghy (with clips on them at the right spots for securing to the side of *Callipygia* where there were padeyes at the gate). While hoisting on the halyard, we kept both painters attached to the mother boat for control.

5. The Dinghy's Outboard Motor

Soon after we acquired *Callipygia*, we found that the existing outboard motor needed to be replaced. We bought a 4-stroke, 4-hp Yamaha, that turned out to be nothing but trouble. While we had it, we spent longer than we care to count rowing.... Apparently, that's the way very small 4-stroke engines are. For environmental reasons, 2-stroke outboards are no longer available in the USA.

The last straw came when we were in St. Thomas, USVI, and we found our outboard's fuel pump was leaking. Fortunately, another boat lent us it's spare outboard (a little 2-stroke 3-hp) for a week, at which point we bought a 2hp, 2-stroke to use while the local Yamaha dealer waited for a new fuel pump. After our motor was repaired, we planned to carry the 2hp as a "spare." After 3 weeks, and still waiting, the dealer took back the 2hp, and gave us credit for our 4hp, and we bought a new 2-stroke, 8-hp Yamaha that we were very happy with for the remainder of our cruising career.

We installed a davit on *Callipygia*'s stern to which we attached a block and tackle to lift the motor out of the dinghy and stored it on a hefty wooden bracket on the stern rail when we were underway.

The Engine Log

On *Callipygia*, the Engine Log started out in a separate spiral notebook, but later was kept for convenience as the front section of the Maintenance Log.

Our Engine Log had three columns, with the first being the date, and the last the hour reading on the engine-hour meter. The middle, and widest column, were used for entering a description of the activity. Initially we had more columns, but that didn't leave enough room for description details and we weren't using all the columns, so the format was modified accordingly.

Routine inspections, the result of the inspection, and details of all maintenance done were listed in the Log. Problems encountered were also entered and described in the Engine Log. When refueling, the number of gallons of fuel put in the tank was entered, and fuel consumption since the last refueling calculated and circled so it was easy to pick out. Cost of fuel and maintenance activities (done by contractors or boatyard staff) were also noted and circled. As well as keeping track of engine stuff, we also logged anything related to the starting system and transmission in here. Hose stuff was logged in the plumbing section of the Maintenance Log because inspection of the engine hose clamps and hoses was done at the same time as clamps on other hoses were examined.

We found it really important to log all this stuff, because our memories were simply not up to it.

Equipment Instructions

You wouldn't believe how many (major and minor) pieces of equipment we finally ended up with. We were fortunate to be given instruction manuals for all boat equipment that came with the boat when we purchased *Callipygia*, whose previous owner kept them in some large ziplock bags. However, we found that we were constantly sorting through the bags trying to find a particular set of instructions so we reorganized the way they were stored. Here's what we did, and we found it worked really well for us.

We sorted the instructions by topic under numbered tabs in two very fat 3-ring binders. Then we put a hand written table-of-contents at the front of each binder showing what was under each tab in both binders. The topics we used were: Dinghy, Electrical, Electronics, Galley, Ground Tackle, Hull and Deck, Plumbing, Rigging, Ground Tackle, Safety, Sails, and Miscellaneous.

Under each tab was one or more plastic see-through sleeves into which were inserted the various equipment instruction papers as applicable. This was done because it wasn't possible to punch holes in all of the instruction material - although some of the instruction pages had to be trimmed a bit to fit into the sleeves. Also, having them in plastic sleeves made it easy to extract the desired pages and keep them from getting wet or more dog-eared than necessary.

The very last tab in the second binder volume had several sleeves in which were assembled all the little bits of instructions that came with various miscellaneous equipment items such as binoculars, pumps, fabric, smoke alarm, timer, tools, wind scoop, grommet tool, etc., etc. When an instruction item was added to one of these miscellaneous sleeves, it was added to the list of contents on a page inside that sleeve which was kept right inside the front of that sleeve.

The two fat equipment instruction binders were kept together on a shelf beside the nav station and contained instructions for all equipment on the boat except as follows:

- For convenience and safety, instructions for the radar, autopilot, and GPS's were not kept in the Equipment Instruction Binders, but on a shelf at the Nav Station.
- Instructions for the SSB radio along with notes on its use were kept separately in a bright orange folder beside the Nav Station (see the Radio Reference Folder.)

The engine shop manual, engine parts manual, the engine operating manual, and notes taken by Bill when he attended the [Yanmar school at Mack Boring](#), were all kept in a separate large binder on a shelf along with other Boat Books.

This organization for equipment instructions worked very well for us, since it meant we could find stuff quickly and easily. The plastic sleeve system allowed us to quickly pull papers out of the binders without constantly having to open and close the rings. Some days it seemed we were looking for help (and usually finding it) in these manuals five or six times and so easy access was crucial to keep ourselves sane.

Heaving To

Learn how your boat does this, and practice often. Do it for a break at lunch time, just to enjoy the day, or when you're going to arrive at your destination too early. Don't be in a rush. We met a fair number of cruisers who didn't know how, or never did this. Here's an outline of the steps taken:

- Check current, sea room, and traffic;
- Figure out how far you can safely drift ahead and to leeward;
- Go into close reach on the port tack, if possible (this will get you heaved too on the starboard tack, which gives you right of way;)
- Bring head just through the wind, and as foresail backwinds tighten the sheet so the clew is at the lee shroud;
- Let the rudder free and trim the main as if for a close reach;
- Adjust the traveler and sheet so the boat gently drifts along;
- Adjust the rudder and lock it so the boat is doing less than 1 knot forward and drifting slowly to leeward;
- Maintain a lookout.

Each boat handles differently. Learn how yours behaves. Practice in strong winds to get an idea of how she'll behave in storm conditions.

Hurricane Preparation

On August 18, 2002, cruisers anchored in the harbor met together at Puerto Blanco Marina, in Luperón, on the north coast of the Dominican Republic. Based on their experience, they pooled ideas about how best to prepare boats in anticipation of a hurricane. These are the notes from that meeting. At the same time, the group initiated a collaborative process to ensure an orderly and mutually supportive response among the cruisers in such an event.

1. General Advice

- The worst part of a hurricane is cleaning up afterwards
- Luperón is the safest harbor in the North Caribbean—the only thing that will sink a boat here is another boat.
- Secure your own boat first, then help your neighbors. Keep busy—and sober!
- Don't expect the DR government to provide any assistance—it will have its hands full responding to land emergencies. There will be no services after a hurricane, so you will be on your own for food, water, fuel, communications, and power.
- If the eye passes over you, the back eye-wall will hit like a freight train, with no build up.
- Make your own decisions—don't go with the herd.
- Expect that cruising and fishing boats from 100 miles away will come to Luperón for shelter in the few days before a hurricane.
- You must figure out where the winds will be coming from, and position your boat and mooring lines accordingly. Moor your boat in stages, as the probable wind direction(s) become more certain.
- Position your primary/storm anchor well ahead so it has plenty of time to set.
- Spread out hurricane preparations—it is extremely physically and emotionally demanding to have to do all in an highly anxious state in the few days before a hurricane hits.
- A hurricane can show up with very little warning—don't count on having 4-5 days notice. Also, it can be very squally for the 48 hours prior to a hurricane's arrival—don't expect you'll be able to do your preparations then. A hurricane crossing mountains will dissipate somewhat but it may spawn tornados.
- To join lines, use double sheet bends not bowlines - they'll chafe. Tie onto mangrove trunks with double clove hitches, not bowlines - they'll chafe. Put a stopper knot behind the clove hitches so they can't tug loose. Use nylon or polypropylene lines for mooring, dacron doesn't have enough stretch and will break without a snubber. Don't use chain or wire around mangroves.

- Tie low down on older mangrove trunks or roots that are 2 or 3 stands in to the shore. Don't tie onto a mangrove that already has another boat's line attached to it. You can drive aground nose into the mangroves, but you risk damage if another boat does likewise close (less than 15') to you. It may be safer to tie on sideways. Your boat will not get hurt by the mangroves. It may get dirty, but it will clean up after.
- If you crawl off your boat into the mangroves in the middle of a hurricane, keep your head down or you may get hurt.
- Ordinary fenders will do little to help fend off other boats in a hurricane.
- Consider filling your inflatable with water and tying it on to your boat as a giant fender. Lines can chafe through rapidly. If you don't have other chafing gear, use plastic grocery bags—they're slippery and they work!
- Let your family know well ahead of time how you will contact them in the event of a hurricane.
- Always keep your boat ready to go to sea. Don't have a stowage system for being at sea and a separate one while in harbor.

2. Hurricane Preparation Tasks

- Remove furling sails, flake, and stow below.
- Remove all other sails, flake, and stow below.
- Remove all deck canvas (awnings, biminis, dodgers, weather cloths, etc.) from frames and stow below.
- Tie down frames for dodger, bimini, etc. securely.
- Remove downwind poles from mast and lash to deck.
- Tape halyard snap shackles with duct tape and pull to top of mast, leaving one so you can retrieve the rest.
- Lash all halyard falls to mast, and make sure no other lines are left on deck to whip in the wind.
- Take undeployed anchors off bow roller and lash on deck ready for use.
- Cap all ventilators.
- Stow below everything that is on deck—if it can get loose and cause damage, it will.
- Remove wind generator and windvane blades.
- Make sure below deck stowage is secured and can't fly loose and hurt you.
- Make sure your cockpit drains are clear.
- Do not rely on the windlass for securing anchor rode.

- Review all your spare chain and lines, put them where you can easily get them, and make sure you know how long and what type each line is. Prepare snubbers. Even if you don't need all your lines for your own boat, it may well be needed to keep another one off you.
- Fill water and fuel tanks and jerry cans.
- Charge your handheld VHF.
- Charge your boat batteries.
- Prepare your ditch bag with cash, documents, food, clean/dry towels, and toilet paper.
- Have a supply of bleach on hand to clean up afterwards and sterilize water.
- If you leave your boat, leave the key in the ignition and tape starting instructions nearby.
- If you leave your boat, notify someone where you'll be –but don't announce it on the VHF.
- If you stay on your boat rig jacklines and have at hand your life vest, snorkel mask, harness, strobe, flash- lights and spare batteries, serrated knife, marlin spike or rigging tool, and bolt cutters.
- Wear deck shoes all the time the storm is in process.
- After your boat is ready, help your neighbors.
- Get another pair of eyes to look your boat over for readiness.

3. Hurricane Preparation Supplies

- Spare galvanized shackles to match your rodes.
- Seizing wire.
- Extra 50 foot lengths of chain.
- Extra heavy-duty nylon line in 100- and 200- foot lengths.
- Heavy duty galvanized or stainless steel thimbles.
- Plenty of line to lash things down with.
- Hand-held VHF, battery powered AM/FM radio.
- Hand-held depthsounder or lead line.
- Sheepsfoot, Leatherman, or Swiss Army knives.
- Masks, snorkels, fins, and filled SCUBA tanks.
- Recording barometer.
- Lots of towels and other material to use as chafing gear.
- Ventilator caps for all vents and dorades.

- Rolls of duct and electrical tape (the latter is a good substitute for Band Aids if necessary.)
- Dacron sticky back tape for sail repair.
- Anchor weights and snubbers.
- Spare flashlight batteries.
- Bleach to clean things, and to purify water.
- Food, water, and fuel.
- Spare cash.

4. After a Hurricane

- Dive down and check bottom, rudder, and prop before you attempt to move your boat.
- Help your neighbors as well as yourself.
- Notify your relatives that you are safe.

5. Storm Anchoring Techniques

[This section is summarized from [*The Complete Book of Anchoring and Mooring*](#) by Earl Hinz.] When planning for staying put in a storm, recognize that ground tackle must have three essential elements:

- Anchor(s) suited to the seabed
- An elastic rode, and
- Chafe protection.

Each element must be equally strong, including eye splices, shackles, and shackle pins. Set your primary/storm anchor as far in advance as possible so it is thoroughly dug in. Have all your other anchors prepared and ready to deploy prior to the storm's arrival.

An all chain rode does not have sufficient elasticity to ride out a storm. Best is half chain and half 3-strand nylon, firmly joined and secured to the boat. Excessive scope is not necessary and, as the water depth increases, less scope can be used.

Chafe is the primary adversary in storm anchoring. Main chafe points are joins in the rode and where the rode passes onto the boat. It is extremely difficult and dangerous to try to wrap chafing gear around rode while a storm is in progress. Even with chafing gear in place, be prepared to reposition the chafe points by frequently paying out a bit more rode frequently as the storm progresses. Chafe occurs as the boat sheers from side to side ("horses") on the anchor rode, and up and down on the waves. Position the boat in the anchorage and deploy ground tackle so as to minimize sheering motions as much as possible.

Think about setting dual bow anchors, bearing in mind the following considerations.

1. If you deploy a second anchor prior to the storm's arrival, set the second anchor in the direction you anticipate the wind will change to, at an angle of no more than 45 degrees to the first anchor. The use of a swivel to join these two rodes is not recommended since it is a weak link.
2. If you wait to deploy a second anchor until the storm starts, use a hammerlock anchor to minimize horsing. This is a second bow anchor dropped under the bow on a short scope at the limit of the boat's sideways movement. This "hammerlock" snubs the boat's horsing considerably. The main wind load is still on the primary anchor. If the wind direction changes, the snubbing anchor will drag into a new position, still providing additional security.

Inventories

While we were cruising we found we needed to maintain some kind of inventory showing all the stuff we stored in *Callipygia's* copious lockers, and where each item was. All the supplies, spare parts, etc., etc. Otherwise, in order to get something, we had to first remember which locker it was in, then hunt through assorted containers until we found the right one. This could be very frustrating and take a lot of time. With the inventory, it got much easier and then after a couple of years we were able to hold in our heads where most of the frequently used items were. We still need to refer to the inventory for a rarely used item – sometimes needed in a hurry.

Our inventory system was pretty ad hoc until my niece, Kath, and her partner Chris, visited for two weeks in December, 2001, while we were in Melbourne, FL, getting everything ready for going to the Bahamas. Kath is about as compulsive as me about organizing things, and she and Chris did a fantastic job of going through every locker and listing every last little item in a computer spreadsheet. About the only things which weren't individually inventoried were fasteners, clips, pencils, etc. These were kept in small plastic boxes or containers according to what kind of items they are, and then the boxes/containers were listed on the inventory.

It must be admitted that it was a huge effort to create the main inventory in the first place, and probably wouldn't have been as well done without Kath and Chris's help. That said, having it saved an untold amount of frustration when we wanted to know (for example) "where does the 3/16" wrench live?" or "do we have any 5/16" dowell?". It was a life-saver in a few emergencies (ours or other people's.)

We kept a printed copy of each inventory in a plastic sleeve in the lexan wall pocket (bought at an office supply store) above the Nav Station. We did a pretty good job of marking up these copies whenever anything changed—ie something was added or used up. We marked up changes on the main inventory pages, and about twice a year its computer spreadsheet was updated from the markup and a new one printed out. This made it really easy to find any item on the list, quickly, and immediately learn where it was located. We still have a copy of it and have shared it with a few interested website readers.

1. The Main Inventory

This listed the quantity, size, description, and type of each item on the boat (except as listed on other inventories described below), and gave the item's location. The Inventory was sorted by type of item (such as "plumbing", "tool", "engine", etc.) and within each type the items were sorted alphabetically by item name. For those items (such as lines, shackles, etc.) that had a size/length, the size/length went before the description for ease of reference. Spare parts had the manufacturer's part number listed beside their description. Also, we re-sorted the spreadsheet by location so we also had a list of (for example) everything that was in Blue Crate #2 in the engine room.

2. Drugs

On a separate spreadsheet we made a Drugstore Inventory which listed all first aid and medical items, showing where they were stored and expiration dates (for prescription drugs). This included an inventory of the First Aid Bag (supplies kept in a clear plastic camping DriBag, with a red tape Red Cross on each side.) A printed copy of this hung in the head.

3. Food

Rather than trying to keep track of edible items, which turned over so much, a shopping list was kept so that when something was used it was added to the shopping list for restocking. Periodically, in advance of a major passage, everything was re-inventoried prior to provisioning.

4. Line

A Line Inventory was created for our first hurricane season (in Luperón). This listed the length and diameter of every piece of available chain, line, cable, and rope on the boat and was kept in a clear plastic sleeve along with all other hurricane reference material in a wall pocket above the Nav Station. Doing this was most instructive. We ended up buying some more line as a result. Having plenty of immediately accessible line of different sizes and lengths is an important Black Box item.

5. Disposable Batteries

The Battery Inventory listed everything (and there were a lot of electrical gadgets) that used disposable batteries, such as AA, AAA, C, D, etc. Doing this inventory really helped us get a grip on how many spare batteries of each kind we need to keep on board - which put us in a position to sometimes help out other cruisers who were in a bind for lack of batteries. We were amazed (?horrificed?) to find how many batteries we needed. We were also amazed at how many times we helped someone out with one of our spares. We then bought a charger and began to switch to rechargeable batteries for things like camera, GPS, etc.

6. Charts and Cruising Guides

The inventory of Charts and Cruising Guides grew slowly and relentlessly as we broadened our reach of cruising areas. We were reluctant to dispose of charts/guides of areas we'd been to, because - who knows - we might go back there. So generally, we kept them all. See the article on Chart Management for details about how we stored our charts.

7. Stowage

For the most part all this stuff (you have to live this life to believe how much it is) was stored by type of item, many times in plastic/tupperware boxes, crates, or ziplock bags. Sometimes it seemed like any time we wanted *anything*, we had to move 3 things to get to it. Over time, we reorganized the lockers and moved items, so that - eventually - the most frequently used things, and emergency items, were in the places that were easiest to

access, and the seldom-used items were in the more inaccessible spots. These changes, of course, had to be reflected in the inventory next time it is updated - but we thought it well worth the effort in terms of time saved searching for stuff, or money wasted by purchasing unnecessary duplicates of items we already had on board.

Landfall Checklist

I wasn't as anal about using this as I was about the departure checklist – it's a much shorter list. For a daysail or an overnight offshore passage, we had things in our head pretty much. This checklist we had laminated for use after a multi-day passage – by the end of which we were usually a bit sleep deprived.

1. Prior to Making Landfall

- Review passage plan for landfall, and pull out charts, cruising guides, etc.
- Make sure you have written navigation directions and necessary/safe waypoints loaded into the GPS
- Develop Plan B for coming into harbor, if you don't already have one
- Check tide and currents
- Transfer plotting work to large scale coastal chart
- Do radio check on the VHF
- If it looks like landfall will occur in the dark, or crew is tired, heave to well offshore and wait until morning or the crew is rested.

2. Upon Sighting Land

- Begin coastal navigation routine
- Attach anchors to rodes and check the ground tackle
- Hoist the Q flag
- Check the depth sounder, and/or ready the lead line
- Rig mooring lines and fenders
- Ready the boat hook
- Turn on the engine, and check the transmission
- Disconnect the wind vane or autopilot
- Drop the sails

Maintenance Schedule and Log

Since these two items are so closely related they are both described in this article. We thought the maintenance system we developed on *Callipygia* was an important way of keeping the Black Box filled up. We reviewed the schedule periodically which reminded us of all the things we might otherwise forget to do. We found that if we didn't write something down, after a few weeks it got lost in the memory haze and then we weren't sure how long it had been since something was serviced - or even if it had been.

The Maintenance Schedule was created in a spreadsheet and then printed out. It covered two sheets of paper (fairly small print) which were kept back-to-back in a plastic sleeve in the lexan wallpocket (purchased at an office supply store) on the bulkhead above the nav station. Our Schedule had the following columns:

- Boat system (such as "engine", "steering", "hull", electrical, rigging, etc.);
- Equipment description;
- Task (description of maintenance work); and
- Frequency (how often the task should be done).

The list was sorted by frequency, then by boat system. From this, three 4x6 cards were made and were pinned on the bulletin board above the nav station. One card had items that should be done every 1-3 months, one card had items that should be done every 6 months, and one card had the annual items. The engine maintenance tasks were listed on the schedule grouped according to the hours of engine use they are done after.

The Maintenance Log was simply a green columnar pad (because it has a lot of columns already drawn in it) with a table of contents hand-written on the cover describing which systems had their maintenance record on which page. The pages of the Maintenance Log were numbered by hand so that it was very easy to look something up. The Log was kept in a lexan wall-pocket beside the Defect Book. The Engine Log was at the front of the Maintenance Log, and all the other boat systems had logs on a single page (2-sides). Once a page filled up, the last entry indicated the page number where the subsequent entries were made.

For the purpose of the Maintenance Log, pages were titled as listed below - note that these were pretty much the same categories we used to file the boat's Equipment Instructions.

- Engine and propulsion
- Electrical
- Electronics and Radar
- Dinghy and Motor
- Fresh Water
- Galley Equipment
- Ground Tackle and Windlass

- Health (who got sick with what, vaccinations, and diagnostic tests, etc.)
- Hull, Zincs, and Deck
- Plumbing and Pumps
- Propane
- Radio
- Rigging and Winches
- Safety Equipment
- Sails
- Steering Systems
- Other and Miscellaneous

A line was entered in the appropriate category when a maintenance or inspection task was done. The first column had the date of the work, and the second a description of what was done. In the two far right-hand columns were listed who did the work (usually "self") and what it cost. This system was very easy to use and keep. And, it took but a moment to answer such questions as "which water tank are we on?" and "when did we last fill up the big propane tank?" or "when did we last service the starboard jib-sheet winch?" or "when did we last grease the windlass?" or "when did we last check the radiator clamps and thru-hulls?"

This system worked very well for us.

The “Office”

When we moved aboard we couldn't quite leave all the trappings of a shore life behind. Mail still needed to be dealt with, financial and health records still had to be checked and filed periodically, taxes done, etc., etc. We found it a major adjustment to go from having easy phone and Internet access and plenty of space in filing cabinets for all this stuff to living on a boat where space was at a premium and all this paperwork nothing but a nuisance. We eventually hit on a system that worked fairly well for us. Here it is.

- We bought an expandable cloth briefcase that zipped along the top, in which we put some expandable pocket folder/files. This brief case sat on the floor in the main cabin under the table next to the mast, where it was out of the way but still easily accessible. In separate folders in this briefcase we kept the following:
- Financial records, including a copy of every card in each of our wallets and numbers to call if the wallet got lost.
- Retirement records.
- Important documents, with copies, of passports, birth-marriage-divorce certificates, wills, and copies of all the important boat documents that were kept in the Owner's Manual. [We updated our wills and completed Durable Power of Attorney and Instructions to Health Care Provider before we moved aboard.] One of our kids also had a copy of each item in here, and a summary list of all financial and retirement accounts, as well as contact information etc.
- Health records.
- Insurance records.
- Information related to our house, which was rented.
- Tax stuff.
- Customs and immigration papers etc., from the different countries visited.
- Receipts for significant boat-related and other expenditures.
- Travel items, such as tickets for upcoming trips.

At our request, our mailing agent, [St. Brendan's Isle](#), forwarded accumulated mail to us wherever we were, or to an anticipated visitor, approximately every 6 weeks. Then we had a day or two of misery while we sorted through everything and attended to life's annoying details (which otherwise we managed to forget about). Most of the financial stuff we did online, once a month at an Internet cafe - checking and paying credit cards and any other bills that might be due. We did our taxes online at Turbo Tax. We were picky about the Internet cafés where we did this, and always closed the browser window whenever we completed an online financial transaction. We were lucky to find some Internet availability in a nook somewhere in pretty much every country we visited.

Then when we started land cruising, we used the same system and continued to use the same mailing agent.

The Owner's Manual

The Owner's Manual for *Callipygia* was a 3-ring binder in which we kept, under numbered tabs, the important boat papers as listed below. At the front of the binder we made a hand-written Table of Contents showing what elements could be found under each tab. This binder lived on a bookshelf in the main cabin along with the other binders containing assorted boat information and records.

Here's the Table of Contents:

1. Documents: Documents related to the boat purchase, federal documentation, and state registration.
2. Licenses: Licenses and certifications related to radio use.
3. Surveys: Boat and equipment surveys in chronological order, most recent on top.
4. Contracts: Marina and storage contracts (if any)
5. Training: Our training records
6. Insurance: Boat insurance papers
7. Tayana 37: Copies or originals of magazine articles featuring the Tayana 37.
8. Waste Management Plan: to meet Coast Guard requirements.
9. TOG Manual: Operations and Maintenance Manual published by the Tayana Owner's Group.
10. Blueprints: Blueprints from when the boat was constructed and copies of the thru-hull location drawings we made.
11. Brochures: Brochures from when the boat was originally marketed.

Waste Management Plan

The Coast Guard requires that all vessels operating in U.S. waters have on board a properly authorized sanitation plan. We heard about a vessel that was boarded in Florida, and fined because it did not have one. Below is the plan that was filed in *Callipygia's* Operating Manual to meet this Coast Guard requirement. This was modeled on a sample provide to us by Nautech at one of their seminars in 2001.

The Captain of *Callipygia* is at all times responsible for implementation of this Waste Management Plan. All crew members and guests agree, as a condition of being on the vessel, that they will strictly adhere to the following requirements.

GENERAL. (1) No waste of any kind, other than dishwashing and showering water, may be discharged overboard without the express permission of the Captain. (2) Discharge of waste on shore will always be done in compliance with applicable governmental law. (3) Crew members or guests coming on board *Callipygia* for the first time will be informed by the Captain that failure to comply with this Plan subjects *Callipygia's* owners to substantial monetary penalties and that such failure will result in the discharge of the offending crew member or guest from the ship.

GARBAGE. Trash will be stored aboard the vessel in appropriate containers and held until it can be discharge ashore by a crew member designated by the Captain.

PLASTIC AND OTHER NON-BIODEGRADABLE WASTE. No plastic or other non-biodegradable waste of any kind may be discharged overboard at any time. All such waste will be held on board until it can be safely discharged on shore in an environmentally sound manner according to local law.

SEWAGE. Only digestive waste shall be placed in the head. The head is discharged into the holding tank which is pumped out at an approved pump-out station after each voyage or as necessary. On extended voyages where the capacity of the holding tank may be insufficient, the Captain may authorize the opening of the sea valves when outside the U.S. territorial limits. The sea valves shall be in the closed position at all other times.

WASTE FUEL AND OIL. No petroleum-based oil or fuel may be discharged overboard at any time. The Captain is responsible for ensuring that: (1) the engine drip pan is drained as needed; and (2) the bilges are kept reasonably clean and free of fuel and oil. Any discharge of fuel or oil will be immediately reported to the Coast Guard. Waste fuel and oil will be stored in sealed plastic containers until they can be discharged ashore in an approved waste oil tank or facility.

HAZARDOUS MATERIAL. All waste with potentially flammable characteristics will be stored on deck in a sealed container.

The Whisker Pole

We didn't use our whisker pole that often, so we kept a checklist to help us remember how to do it.

- Release snap from fitting at base of mast
- Turn the pole so the mouth faces forward
- Attach halyard to mouth end and raise it and cleat it off
- Lower the gooseneck
- Adjust the halyard
- Pull the end of the pole out of the gooseneck by releasing the pin, and put the other end into the clew of the sail, or onto the sail sheet
- Put end of pole back into the gooseneck and jam the gooseneck control line into the cam cleat.
- Tie a line to the pin-release at the clew end of the pole and bring it back to the mast and secure it. Use this line for releasing the clew of the pole
- Push both buttons at the gooseneck end of the pole to lengthen the pole as needed. Buttons lock into holes
- Run a line forward from the clew end of the pole forward to a cleat, and also a line aft to a cleat to lock the pole in position.

Setting Up the Wind Vane

We made this checklist to help us until we got familiar with setting up the Monitor Wind Vane. We tended to use the Autopilot for shorter trips or if we were under power. While sailing, we found that the Monitor did a splendid job under most circumstances.

- Red (starboard) line goes over the top of the wheel (on the helm) and through the first hole
- Blue (port) line goes under the wheel and through the second hole
- Take lines off the wheel and tie together with a square knot
- Put lines back on wheel and tighten the knot
- Put vane on pendulum between the metal plates. It goes uphill, bottom end away from the boat and pendulum away from the boat
- Drop the Monitor's rudder and latch it
- Assume desired heading and trim sails so boat is balanced
- Use the remote line (turns chain wheel on Monitor) to turn the vane into the wind (the uphill side, same side as pendulum)
- Engage the wheel

Chapter 4 – The “What If’s”

Because our memories were no longer what they used to be, when we started cruising I made up a bunch of x file cards on various subjects that simply listed in sequential order the steps to be taken to accomplish tasks that might have to be done in emergency situations. These cards were pulled out and reviewed periodically. The cards supplemented our standard operating procedures which covered the more routine activities of the cruising life. .

Those reference cards that were related to safety were pinned on a corkboard beside the nav station, and reviewed with people who came on board to crew for a while. Other cards were clipped to the front of a lexan wall pocket (bought from an office supply store) that was screwed into the bullwark above the nav station, and which held some small laminated charts to track weather systems on with a china pencil, and clear plastic sleeves/envelopes holding: the inventory; hurricane preparation references; the maintenance schedule; quick reference cards we got from the Red Cross describing what to do if someone chokes, has a heart attack, or stops breathing. In front of the stack of these cards was a card with a sign in big letters that says "Don't panic. Take five deep breaths, and feel them in your belly. Relax your body."

As the captain, I went to school on reading about, and practicing mental "what if..." situations. Mental practice was an important aspect of keeping the Black Box filled. In an emergency, if one doesn't know what to do, there is a tendency to "freeze" or panic. Not useful at sea. We had a few emergencies where the prior mental practice paid off.

This Chapter documents the “What If’s?” we worked out ahead of time so as to be prepared in the event of an emergency situation:

1. Abandon Ship
2. Aground
3. Anchor Dragging
4. Crew Overboard
5. Collision
6. Distress Calling
7. Fire
8. Fog and Sound Signals
9. Heavy Weather
10. Leak
11. May Day
12. Medical Emergencies
13. Radar Plotting

- 14. Rigging Failure
- 15. Steering Failure
- 16. Towing

Abandon Ship

You have only about minutes to abandon ship if you have a major leak and can't stop it. That includes the time spent assessing the damage and trying to plug or correct the problem. During my training in a safety course at the Maritime Institute of Graduate Studies I tried climbing into a life raft from the water with clothes and PFD on. I couldn't do it (only about half the class could). I started doing daily pushups thereafter to increase my upper body strength, but it taught me that if ever we had to abandon ship we should get into the life raft from the boat, and not go into the water first.

- All crew put on their PFDs.
- One transmits May Day on the SSB and the VHF while you still have power.
- Others assemble the following items in the cockpit:
 - EPIRB;
 - Yellow Bottles containing flares;
 - Ditch Bag;
 - Emergency dribag of warm clothes
 - Emergency watermaker;
 - Leatherman knife;
 - Ship's Log, Handheld VHF, and GPS;
 - Dinghy oar;
 - Seat cushions (floatable);
 - Ziplock bag with wallets, passports, boat papers, etc; and
 - First Aid kit
- One person releases water jerry jug (with line) from its deck tiedowns
- Other person puts Leatherman knife in pocket and small grabbed items in Ditch Bag
- One person passes the items from the cockpit to the person on the deck
- All inspect the life raft tether attachment to the boat to make sure it is secure
- Deploy the life raft on leeward side of the boat (so it stays close to the boat and is shielded from the weather)
- Tie Ditch Bag, yellow bottles and water jug with rolling hitches to life raft tether
- Throw the yellow bottles and water jug overboard
- One climbs into the life raft. Make every effort to climb into life raft from mother boat. It's incredibly difficult to haul yourself into a life raft from the water.

- Others hand the Ditch Bag, water maker, cushions, clothing, and oar into the life raft and immediately climb in
- Haul on the tether to retrieve Yellow Bottles and water jug
- Activate the EPIRB and leave it activated
- Let the tether out as far as possible and prepare to cut it - but only when the mother boat is clearly sinking. Note however, that a life raft cannot be towed or held alongside for long without suffering damage.
- Take seasick pills out of Ditch Bag, and swallow one or two.

Aground!

This happens to every sailor at least once (except liars.) I learned the following to ways avoid it:

- Go the long way round—it is only time.
- Do not rely on your GPS near shore.
- Stay well off a lee shore.
- If you must go through a rocky area, or one with coral heads, post a lookout high up in the bow, with the sun behind him/her so s/he can visually pick out where the dangers lie.
- Don't let someone else tell you what to do, even if they think they're an expert (we went aground once in the Bahamas while testing a new autopilot because the "expert" installer thought he knew more than I did and let go of a dock line without waiting for my signal.)

So, it does happen no matter how careful you are, the only question is when. So I thought through what to do when grounding occurs and made notes as follows:

- Think, "what is the state of the tide? Is it rising or falling, and if so by how much? Is it a spring tide?"
- If you go aground at the top of a spring tide, you must act very quickly or you could be stuck for a couple of weeks.
- If you go aground under power, immediately go hard astern and try to slide back out along the groove your keel made. If this doesn't work, go slow ahead while swinging the rudder back and forth to dig a wider groove, then after a few minutes again go hard astern. If this doesn't work, desist and kedge or sail off as below.
- If the tide is rising, you may be able to sail off. In any case, try to get the boat heading towards deep water.
- If the wind is blowing from the shallow, back the jib to blow the head round, then tighten all sheets to heel the boat and sail off.
- If the wind is going onto the shallows, gybe hard if you can and then trim the sheets in tight to heel the boat as she rounds up.
- A rising tide will likely drive you further into the shallows. If you cannot get off the shoal, then anchor the boat quickly to keep that from happening.
- To kedge the boat off, put the primary anchor (or stern anchor) well out into deep water upwind or uptide with plenty of scope. Then winch in on the anchor rode. At the same time try to heel the boat. With a big falling tide, this may have to be done FAST.
- Reduce the draft of the boat as much as possible by:

- 1) Heeling the boat towards the shallows: (a) push out the boom and have crew sit on the end; (b) take a halyard off in the dinghy and haul on it—carefully, this puts a lot of strain on the mast.)
 - 2) Jettisoning the water from the tanks, and or other heavy items into the dinghy or overboard.
- If you start to heel, close all portholes and hatches and thru hulls to keep water out of the down side. Do everything possible to make her heel towards the shallows so that:
 - Water will be less likely to enter the boat as the tide rises.
 - The keel will slide down the bank into deeper water as the tide rises.
 - To set an anchor from the dinghy:
 - Put the anchor in the bottom of the dinghy along with all of its warp on top of it, making sure the end of the warp is secured tightly to the boat;
 - Let the warp pay out from the dinghy as you go rather than being dragged through the water from the boat.
 - Be careful not to wrap the warp round the dinghy prop.
 - Drop the anchor from the dinghy quickly as soon as you're at the end of the warp.
 - If you end up drying out, then put mattresses, cushions, etc under the bilge to protect it from damage on the rocks. Consider rigging a leg (see Handling Troubles Afloat page).
 - If you decide to go over the side onto mud, always wear a safety line and have someone on board watch you. [We know someone who died in the mud of the Chesapeake Bay after climbing over the side when his boat went aground.] Walk fast in soft mud and walk on your toes. Take an oar as a walking stick. If you are taking gear with you (anchor, chain, etc) make a sled to drag them (cockpit grating, door, dinghy, etc.)
 - If you should go aground in heavy surf and it looks like the boat may break up, consider scuttling her to reduce the pounding. Best to do this off a sand beach. Open all seacocks and remove hoses, open the portholes and hatches. If possible lay anchors to seaward and moor her to shore to hold her square. When the tide leaves her, so will the water inside. As the tide goes out, close the seacocks etc. and prepare to refloat the boat.
 - If you have to be towed off, be sure you've figured out how to get it done without damaging your keel, rudder, propeller, etc. Then convey that information to the tow boat before anybody starts anything.

Anchor Dragging

If you're lying at a different angle to all the other boats, figure you're probably dragging. Or, if the speedometer indicates movement while you're at anchor (and you're not lying in any current) then you surely are. In a squall, it's likely to be immediately obvious if you're dragging - but then there's the creeping drag, which happens more slowly, especially after you've wandered all round the anchor in some calms. In the latter case, there's more time to respond. You either reset the anchor under power, or let out some more rode (if there's room) and reset. If this doesn't do the trick, then re-anchor. In the former case it can be a life or death situation (for the boat) so quick action is needed as listed below.

NOTE: We always kept the dinghy tied to side of the mother boat at night. This meant that if we had to move quickly, we didn't have to worry about getting it's painter wrapped round the propeller when we turned on the engine. Here's the action steps:

- Turn on the engine to take strain off the rode and hold position while you decide what to do.
- Get all crew up on deck.
- Grab the earphones and put them on so we can talk to each other.
- One goes forward to work the windlass, the other stays at helm.
- If plenty of room in the anchorage, let out more rode and try to reset the anchor.
- Consider dropping the second anchor under the bow, and slowly letting out its rode while we drift back until it grabs.
- If these don't work, or there's no time, or it's a tight squeeze, maneuver slowly under power (being careful not to wrap the rode round the propeller) and haul up the anchor.
- Then find a new spot and re-anchor, if available.
- If the anchorage seems dangerous, reposition dinghy tight astern and head for an alternative anchorage using previously selected waypoints and radar as needed - you did have a plan B, didn't you?

Collision

A freighter can be on you from the horizon in less than 10 minutes. Your vessel may be invisible from its deck – or it may not have its radar on. At night, its watch may be half asleep, in the mess or in the head. Most collisions take place at night. For large ships, generally do not try to pass ahead. Change course or speed so that it passes ahead of you. You have nothing but time. We met a few boats who'd suffered serious damage in a collision and heard of others that had sunk after one.

1. Collision Avoidance

- The person on watch does a 360 degree lookout no less frequently than every 8 minutes. Use a timer if drowsy.
- Know when you are in a shipping lane—mark them on the charts
- Turn on the radar at dark or during the day if in doubt
- As soon as another vessel is spotted, note the time in the log, and also its compass bearing. Sight it over a stanchion or winch
- If it's dark, mark the first-sight spot on the radar screen with a china pencil/dry erase marker (get out the Radar Plotting Checklist)
- Use binoculars to assess the aspect of a vessel, or at night, to identify its lights (range lights and red/green navigation lights)
- Turn engine on if needed to maintain or increase speed
- Practice, practice, and re-practice identifying what different lights and light combinations mean – this puts lots of points in the Black Box:
 - At night, green to your green or red to your red is OK so long as they stay that way
 - At night, If you see both red and green the other vessel is coming straight at you. Alert the captain, and if immediately necessary turn hard to starboard.
 - At night, red on your starboard side means you give way. Turn to starboard to pass astern of the other vessel. [In theory, if you are sailing and it is powering, it gives way but don't count on this. Better make a turn obvious and early and put your red to its red]
 - At night, green on your port side means you should stand on and the other vessel should turn right to pass behind you. Alert the captain. It may not have its radar on, or the watch may be asleep.
 - Red over white – fishing at night
 - Green over white - trawling at night
 - 2 or 3 vertical white lights - a tugboat towing another vessel < or > 600' astern.

- If you see yellow over white, turn round. You are approaching the stern of a vessel. Never get between a tug and its tow.
- Yellow/orange light underneath 2 range lights - submarine
- Blue light underneath single masthead light - law enforcement vessel
- As a general rule, for the first few minutes after spotting another vessel, maintain course and speed and watch carefully to see if the vessel's bearing changes. If in doubt, or the bearing does not change, slow down, alert the Captain and assume a collision course.
- On possible collision course, turn on the Radar and start tracking the target on it.
- If the vessel is directly ahead or on a constant bearing, contact the vessel on the VHF (channel 16 or 13) to determine its intentions. If you do not reach it on the VHF, slow down or stop the boat to gain time. Watch carefully what happens to the bearing and the boat's aspect to find out which side you will pass on. Altering course too soon could put you closer to the vessel rather than further away. Turn on the engine. Once it is clear which side you will pass on, turn hard in that direction and pick up speed - assuming the other vessel does not change course.
- Action taken to avoid another vessel should be taken early and should be obvious
- To call on the VHF (16 or 13) say "Vessel heading (direction from compass) near (whole degrees of Lat/Long)". "This is the sailboat on your...(relative position - eg starboard bow). What are your intentions?"
- To get attention of another boat and the VHF doesn't work, shine a spotlight on your sails, or set off a white flare. Also, blow the air horn (repeats of 5 short blasts) or use the spotlight (repeats of 5 short flashes).
- If, after everything, it appears that collision is unavoidable, turn head on to take the impact on the bow (the strongest point of the boat) and put the engine in reverse to reduce speed.

2. Collision

- Everyone puts on a PFD and does everything possible to get clear of the other vessel.
- Helmsman writes down the time and GPS position on a piece of paper and puts it in his/her pocket.
- If your vessel is leaking or sinking, attend to leaks and/or abandon ship
- Stand off the other vessel and get in radio contact (VHF 16 or 13)
- Get the name of the other vessel, tonnage, homeport, where bound, and last port.
- Write it down.
- Give the same information for your vessel.

- Make quick assessment of damage, and trade damage reports.
- Offer assistance as appropriate.
- As soon as possible contact the Coast Guard and describe the incident.
- Attend to the damage.
- Notify your insurance company as soon as possible

Crew Overboard

We learned that, in general, if a person falls overboard from a boat, they only have a 50% chance of being recovered. Consequently, it's important to take every precaution to prevent this from happening. Here's our drill. Periodically we practiced with a flotation ring.

1. Prevention

- No-one steps out of the cockpit unless another person is in it, day or night.
- When going out of the cockpit in other than calm weather, wear PFD. Attach tether to harness and jackline if it's at all rough.
- Always keep one hand for yourself. Do NOT hold onto the lifelines; use shrouds or fixed handholds.
- Always put on shoes when going forward from the cockpit.
- At night, the person on watch wears PFD with tether attached to cockpit padeye.
- Remember that if you go overboard you have a 50% recovery chance—so long as someone sees you go. If no-one sees you, you're dead.

2. Retrieval

- Alert all the crew, and pull the pin out of the MOM (Man Overboard Module) to deploy it. (Before we had the MOM, we had a LifeSling.)
- Helmsman immediately does a Quick Stop if possible. If going too slowly, or seas are too big, then do a Reach and Stop. (See 6 and 7 below - we practiced these maneuvers periodically.)
- Press and hold the Nav/MOB button on the GPS, and then choose GoTo to keep a constant fix on the COB's position
- If the MOM doesn't deploy properly, throw overboard the DanBouy with Forespar lantern and whistle, and all the cockpit cushions
- One person (if available) keeps the COB in sight and shouts encouragement to him/her.
- Quick Stop: Head into the wind and let sails backwind while the boat circles the COB.
- Reach and Stop: Go into beam reach, count slowly to six, then tack and head back on broad reach to a spot two boat lengths downwind of the COB. When you are almost directly downwind, head into the wind, luff up, and stop the boat near the COB.
- Throw the throw-rope to the COB. If necessary, also throw the dinghy towline (yellow polypropylene).

- Drop the swim ladder, head into the wind near the COB and come down near him/her. If it's at all windy, come down on the windward side even if that's not where the swim ladder is.
- If you can't maneuver under sail, turn on the engine being very careful not to get the propeller anywhere near the lines or MOB. It is better to do it under sail.
- If the COB is unconscious or needs help, another person puts on PFD with a long line tied to the boat, and then - carrying flotation and a second line - swims to the COB to bring him/her back to the boat.
- Other methods for bringing COB back on board:
 - COB climbs swim ladder, with or without assistance, if able;
 - Drop a line over the side tied off at one end, and led to a winch on the other. COB needs another line or hands to hang onto and must be able to keep legs straight feet spaced apart. (This is called the Elevator Method);
 - COB is hoisted up using a halyard (like sack of potatoes) COB must be able to put MOM horseshoe round himself—or have it put around him/her, and attach halyard to MOM horseshoe lifting rings or to his/her harness;
 - Swing boom out over COB and put the running backstay tackle on the rear padeye to haul him/her up via the horseshoe or harness;
 - Drop the storm jib in the water (attached to the boat at all 3 corners) and roll the COB onto the sail, then haul him/her up in the sail. This may require another crew member to be in the water (attached to a safety line) to help.

3. Action by the Person in the Water

- If PFD doesn't inflate automatically, blow it up
- Do not try to swim, except to get to the MOM or retrieve the throw rope
- Put the MOM horseshoe under the arms and pull the quick connect strap. Pull on the pylon lanyard and get close to the pylon. Wrap your feet round the part of the pylon that's underwater with your arms round the upper part.
- If the MOM doesn't deploy, grab whatever flotation is available, and conserve energy. Get into the HELP position to maintain body heat
- Remember you have a strobe light and a whistle on your PFD. Use them if necessary.
- As soon as you get the throw rope, tie it onto the MOM lifting rings (or both harness rings) with a one-handed bowline (you've practiced this, haven't you?)

4. After Retrieval

- Treat COB for shock and hypothermia
- Go to school on what happened and take preventive action for the future.

5. If Unable to Retrieve COB

Do not give up. Amazing things can happen. Keep a log or diary of how you're searching – make a grid on paper with GPS coordinates and make passes over each square of the grid. Factor current and wind into decisions about where to search. Send someone with binoculars up the mast to keep on spotting in 360 degree circles. While you keep on searching for the COB do the following:

- Get on the radio and announce a MayDay
- Remember that the law of the sea requires all vessels to respond to calls for help – and this includes you if/you ever hear another boat's request for assistance
- Call the US Coast Guard and request advice and/or assistance
- Do not give up searching until all hope is exhausted and the amount of time elapsed extinguishes all possibilities for the COB to have sustained human life adrift on the ocean.
- In the sad event the search must be called off, report the loss to the Coast Guard, and other authorities depending on your location, and then make other appropriate notifications.
- Use the radio to get grief counseling and/or other support for the remaining crew.

Distress Calling

Use "May Day" when imminent danger threatens life or property and immediate assistance is required. Use Pan-Pan ("Pahn Pahn") when the safety of a person or vessel is in jeopardy, but the danger is not life threatening. Add the word "Medico" to Pan-Pan for medical emergencies. NOTE that VHF and 2182 (SSB) only transmit over about 20-30 nautical miles under normal conditions.

1. Before Each Trip

- Review instructions for transmitting GMDSS Distress signal on each radio -VHF and SSB - See(II) and (III) below
- Review transmission of May Day and other distress signaling techniques (See IV and V below)
- Do a radio check on an appropriate frequency on each radio.
- Review operation of the EPIRB.
- Test the EPIRB.
- Charge the hand-held VHF

2. Automatic Distress Signal On The VHF (Standard Horizon Spectrum)

- Make sure GPS is on and giving a position reading on the VHF screen
- Lift red cover over Distress key, and press the key once. If there is no time to have the distress signal include "Nature of Distress" (steps 3-5), then hold the Distress key down for 3 or more seconds.
- Turn the lower left knob (Channel Selector) anticlockwise one notch to select "Nature of Distress" and then press the "Call/Set" key.
- Turn the channel selector anticlockwise and pick the appropriate nature of distress, then press and hold the "Call/Set" key to transmit the Distress Signal.
- Nature of Distress options are: Fire, flooding, collision, grounding, capsizing, sinking, adrift, abandoning ship, piracy, and man overboard.
- The radio will transmit the Distress signal, and afterwards emit the Distress alarm
- The radio will retransmit the Distress signal every four minutes until it receives an acknowledgment, at which point it will switch to Channel 16
- To cancel an automatic distress call, turn off the radio.

3. Automatic Distress Signal On The SSB (ICOM M710)

- Turn on the SSB (press the "Power" switch)
- Push the 2182KHz button to select the emergency frequency

- Push the two orange-labeled buttons together (Tx Freq and Alarm) for 1 second to initiate transmission of the distress signal. Let it transmit for at least 30 seconds.
- Push Alarm to turn off the alarm transmission
- Take the microphone (black handset) and transmit a May Day
- If you get no response on VHF or SSB, get out the Using the SSB checklist and try to contact the Coast Guard or begin scanning SSB channels 13-37, then 43-88, (ham frequencies) and then marine frequencies 8-1 to 8-9. When you hear voices, transmit May Day

4. Transmitting A May-Day [Pan-Pan Is The Same Format]

- Transmit May Day call on the SSB and the VHF while you still have power. (See the May Day article for details.)
- Transmit using the emergency buttons of each radio
- Transmit verbally on VHF Channel 16 or SSB as follows:
- This is [boatname], [callsign]; This is [boatname], [callsign]; This is [boatname], [callsign]. Give Lat/Long position or distance and bearing from landmark.
- If there is no response after a few moments, repeat the above message.
- After transmitting a May Day or Pan Pan, and you no longer need help, you must cancel as follows:

5. Other Distress Signals

- Fire red parachute or handheld flares (fire downwind)
- Smoke, from can or light a fire in a bucket (careful, down-wind side of boat)
- Waving arms above head
- Continuous horn, or SOS (Morse Code ... - - - ...)
- Dye marker in the water
- Fly November code flag with Charlie code flag underneath it
- Fly orange flag with black ball and black square on it
- Fire a strobe light (high intensity white flashing once/second). There's one in the Ditch Bag. Also, turn the Forespar lantern upside down and it will start firing. Finally, there's a strobe light on each PFD.
- Turn the US flag on the stern upside down
- Anything else to draw attention to the boat (spray paint HELP on a sheet and tie on deck, hang from shroud, eg)

6. Receiving Help

- Do not let a large ship come too close to your boat, or it is possible it could dismast your boat. Make the ship's crew launch a lifeboat and come to you, or fire rockets bringing lines to the boat.
- To get help from a helicopter, follow the directions of the pilot. Communicate over the VHF or with hand signals. The downdraft from a helicopter may make it impossible to hear and difficult to stand upright. Do not touch a wire cable from a helicopter until it has grounded in the water or on deck. Do not cleat a rope hanging from a helicopter or you will tether it.
- If an injured person is transferred to another boat or helicopter, write down their name and nature of injury/illness and pin it in a ziplock bag to his/her clothes.
- If you abandon ship, leave a note pinned to the Nav Station with your name, date of abandoning the ship, and your destination.

Fire

Besides sinking, the greatest threat to any vessel is generally fire. A fire prevention mindset is essential on a boat. Once started a small fire can very quickly become a big one. Do mental practice of these procedures.

1. Fire Prevention

- Always turn off propane solenoid and let burners on stove die before turning stove knobs off to exhaust the gas from the lines.
- Always check all burners are off before turning one on to light the stove
- Keep propane tanks in cockpit locker that vents overboard
- Cook stays in/near galley whenever stove is on, especially near if it's on low heat
- Gasoline tanks are kept tied on the deck
- Run all gasoline out of the outboard before storing it on the cockpit rail
- Check smoke alarm is functioning OK once a month
- Turn on the CO detector whenever the engine is running
- Oily cloths (or those used with flammable liquids, polishes, paints, etc) should be discarded after use—never kept them in an airtight bag/container. To keep for continued use another day, put them in an open bucket on the deck or in the cockpit.
- Run the blower in the engine room after any propane is exhausted from the stove by mistake.
- Fill the gasoline tanks on the dock and not on the boat
- Close the hatches and portholes on the windward side of the boat when refueling
- No smoking on board
- Service fire extinguishers annually
- During routine maintenance, inspect the condition of all wiring running through the place where you are working
- Acquaint everyone on board with: (i) location of all 4 ABC fire extinguishers and the fire blanket; (ii) the three categories of fire (A=wood, paper, plastic, cloth, rubber; B=flammable liquids, grease, paint; C=electrical, wiring, fuses, etc.); and (iii) how to fight a fire

2. Fire Fighting

- If there's an explosion, prepare to abandon ship. If time permits, deploy the liferaft, otherwise grab life vests and jump overboard.
- If underway, helmsman turns and holds boat with head into the wind.

- The first thing to do is to fight the fire; do not waste time transmitting May Day or Pan Pan unless you are abandoning ship.
- For galley fires, immediately turn off the propane switch, then:
- Engine fires:
- Fire below decks.
- Use fire extinguishers (see below) to extinguish the fire and/or smother the fire with the fire blanket.
- If it's behind a cupboard door or locker hatch, feel the exterior. If too hot to touch, open very slowly and immediately deploy fire extinguishers into the area.
- Use a fire extinguisher as follows:
- Stand about 6' back from the flames.
- Back the fire into a corner if you can. Then try to smother it. The extinguisher will only go for about 30 seconds before it is spent. Get other crew to bring remaining fire extinguishers, water buckets if appropriate, and the fire blanket.
- Fires that have been extinguished by smothering must be cooled so they don't smolder and relight. They can be cooled with water, baking soda, or wet towels. The area around the fire must be cooled, as well as the location that was burning. Air into the burnt area should be reduced to a minimum concomitant with keeping a watchful eye on it for several hours.
- Next, clean up and repair, rewire, etc.
- Go to school on the fire, and take some lessons learned.

Fog and Sound Signals

Put points in the Black Box by memorizing sound signals and printing a list for regular review.

1. Fog

- Never set out in fog.
- When underway and fog settles in, immediately reduce speed.
- Chart your progress on the chart frequently as appropriate - always know where you are.
- Turn on the radar, and start maintaining radar watch on range of 3 miles or less
- If necessary to maintain or control progress, turn on the engine.
- Put on PFDs, with tethers if rough weather.
- Listen on the VHF to Channel 16 and 13 in Scan mode.
- Post a lookout on the bow to Look AND Listen for vessel and buoy sounds, breakers, and shore noises.
- Person in cockpit also Looks AND Listens for overtaking vessels. Wear (family radio) headphones to communicate with lookout on the bow.
- Idle the engine periodically to make it easier to listen.
- Make the appropriate sound signals as indicated below.

2. Sound Signals

Put sound symbols on an Air Horn or can of air. Carry a spare can.) Here's a short list to memorize:

Fog Signals – every 2 minutes:

- | | |
|------------------------------|---|
| • Long: | Under power, making way (every 2 minutes) |
| • Long, long: | Under power, not making way (every 2 minutes) |
| • Long, short, short.: | Towing, fishing, sailing, NUC |
| • Long, short, short, short: | Manned vessel being towed (every 2 minutes) |
| • Bell for 5 seconds: | At Anchor (every minute) |
| • Short, short, long: | You are running into danger |

Other sound signals:

- | | |
|--------------------|-----------------------------------|
| • 1 short blast. | I am altering course to starboard |
| • 2 short blasts . | I am altering course to port |
| • 3 short blasts | I am going in reverse |

- 2 long blasts, 1 short blast I am overtaking on your starboard
- 2 longs, 2 short blasts I am overtaking on your port side
- 1 long blast, 3 short blasts I agree to your overtaking on the side indicated
- 5 short blasts. Danger – watch out

Heavy Weather

Depending on the nature and length of the weather expected, careful judgment is called for as to the timing and amount of preparation. I tended to be on the cautious side, and assumed the weather might get a bit worse than the forecast. If bad weather was coming, we stayed in port if we could. No point in starting off in a storm. If a storm comes, you want to be well away from the coast. Also, difficulties in a storm may be more with the crew rather than the boat.

Remember: It is very difficult to do anything on the deck once a storm has arrived. Prepare EARLY and THOROUGHLY.

1. First Stage

- Take seasick pills and give everyone a supply of vomit bags (ziplocks)
- Turn engine on and charge batteries
- Get current weather forecast and decide on strategy
- Reduce sail and/or heave to
- Check that the portholes and hatches are tight, and put drop boards in companionway
- Review position, and navigation plan and hazards
- Prepare hot food, some hard food, and hot water. Fill everyone's water bottle.
- Secure wind vane and bring up its rudder
- Remove tow generator from water and stow below
- Tighten running backstays
- Check everything on deck is secure: tie downs, halyards, dinghy, etc.
- Secure everything below as needed (see checklist)
- Bring loose and unneeded items from deck/cockpit and store below
- If lightning expected, hang copper protector over lee side and put GPS and handheld VHF in oven
- Eat a hot meal.
- Keep a watch, and maintain the log and plot current

2. Second Stage if Necessary

- Put chafing gear on windward sheets
- Lash the mainsail to the boom, and lash boom to boom gallows
- Turn dorades to leeward, or remove and put on covers
- Secure cockpit lockers and engine room

- Prepare to deploy the sea anchor
- Bring in cockpit cushions and stow below
- Close all sea-cocks except for cockpit drains. Leave open engine intake/exhaust if the engine will be run. If these will be closed, tie note to the starter key. Tie note to 'frig starter switch indicating the drain is closed.
- Decide what to do about using the head.
- Get out and have handy:
- Remove bimini and dodger to reduce windage.
- Consider releasing oil (1 quart every 3 hours) - open sink drain seacock and put a pin hole in oil bottle, and put the bottle in the sink (if this is the windward side). If sink is on the leeward side, hang (plastic) bottle from a windward shroud.
- Keep engine on if needed to maintain way--so long as exhaust is not in danger of getting swamped. If so, turn engine off and close exhaust seacock and put reminder flag on starter key
- Keep radar watch if everyone is below and there's enough power.
- If possible, check on deck for chafe, etc., periodically.

3. Stowage Checklist (for a big one)

- Remove all potentially loose items and bag them in double see-through big plastic bags. Store them under table, in the shower, in sail locker, or on the V-berth
- Close the door to the V-berth and lock it closed from the cabin.
- Stuff towels or cushions in food lockers and galley equipment spaces.
- Put the extra bungies on all the shelves, radio equipment, etc.
- Secure the engine room.
- Close the hammocks with safety pins or bungies.
- Put positive locking (or duct tape) on all lockers, lids, floorboards, nav station desk, etc.
- Put cockpit cushions on cabin floor for third berth if needed.

Leak

Probably the worst emergency at sea is a leak below the waterline. A boat can sink in just 2 or 3 minutes with a major leak. Thus, quick action is needed to assess the damage and take appropriate action. Additionally, big leaks often start out as small ones: therefore, it is essential to check the bilges - daily when at anchor and hourly when underway. That way, a small leak will be identified early on - hopefully in time to prevent it becoming a big one.

NOTE: This checklist was written specifically for *Callipygia* - she had too many thru-hulls (6 below the waterline) - the only weakness we can think of in an otherwise extremely safe offshore sailboat. Soon after we bought her, we made a diagram of the location and purpose of all thru hulls and vent holes on the hull from the outside, and gave them an identifying number. Then we figured out how to reach each one from the inside. Because of this weakness, we checked hoses, clamps and seacocks at least every three months. And, periodically, we reviewed this Leak checklist and assigned responsibilities and went through the motion of performing these assigned tasks. We made sure we knew how to get at every one of the through-hulls quickly. A couple of them were a real trial.

1. Before a passage, lay out for easy grabbing, the headlight, 2 hammers, spare bungs, and 2 pairs of wire-cutting pliers. Also, self-sealing tape, bicycle inner tube, radiator clamps and nut driver to fit.
2. If water is found in the bilge decide whether:
 - You have collided with something and holed the boat (container, log, submarine, whale, rock, etc.)
 - Alternatively, has the hull-deck seam come apart from falling off a wave? If any of these has happened, you will probably know it.
 - Or it is from the propeller shaft—a line has wrapped round it, or some fishing gear—are you in an area known to be fished? If the engine was on, and you hear a change in sound—immediately go into neutral.
 - Or it is most likely a thru-hull – there has been no thump or bump. In this case is it a fast leak or a slow leak?
 - Or it is from a leak in the fresh water tank or hoses. Taste it (yuk) - is it salty or not?
3. Helmsman alerts all crew and turns on automatic bilge pump and starts pumping the cockpit bilge pump.
4. If it is known which side of the boat the leak is coming from, helmsman turns the boat immediately to bring that side "up hill".
5. If thru-hull or shaft is suspect, non-helm crew member puts on headlight and grabs hammer, bungs, and wire-cutting pliers and goes into engine room. Then pulls off the square that closes off the engine, and:

- Checks the propeller shaft for leakage. If engine is on, tell helmsman to go into neutral and turn the engine off, then into gear. If leaking, wrap it in stretched bicycle inner tube with radiator clamps.
 - Closes #12 (frig intake - on floor behind engine on starboard side). This one is below the waterline.
 - Checks, and if in doubt closes, #5 (engine intake - under drip pan on port side) calling to helmsman to turn off the engine first. This one is below the waterline.
 - Checks #6 (automatic bilge pump -- forward thru-hull under engine room shelf). If water coming in it, calls to helmsman to turn off the pump, and closes it. This one is at the waterline.
 - Checks #7 (forward cockpit drain - aft thru-hull under engine room shelf). If water coming in, closes it. This one is at the waterline.
 - Checks #8 (frig exhaust - port side aft of shelf, 2nd from stern) and closes it. This one is at the waterline.
 - Checks #9 (heating exhaust - port side aft of shelf, nearest stern, high up) and closes it (if system is on, call to helmsman to turn it off first.) This is above the water line.
6. Crew then climbs into lazarette (under helmsman's seat) with hammer, bungs, wire-cutting pliers, and seacock handle extension pipe and:
- Checks #10 (engine exhaust - starboard side nearest stern), if leaking calls to helmsman to turn engine off, and closes it. This is above the waterline.
 - Checks # 11 (aft cockpit drain - starboard side, a bitch to get at). If necessary close it. This one is at the waterline.
7. Meanwhile, the other crew member is in the cabin with hammer, bungs, and wire-cutting pliers and:
- Checks and closes #13 - (salt water intake for head, washdown pump, and galley – access is under cabin sole in front of door to head). While there, inspects the 3 transducers for leakage. These are all below the waterline.
 - Checks and closes #1 (head sink drain) and #2 (head outlet overboard). Both are under the head sink, access is through the bottom louvered door. These are below the waterline.
 - Checks #3 (manual bilge pump – access is through trap behind forward port seatback in main cabin). If leaking, closes it. This one is at the waterline.
 - Checks and closes #4 (galley sink drain - immediately to the right just inside the cupboard door under the sink.) This one is below the waterline.
8. Do not give up searching for a leak until the water level in the engine room or cabin drives you out.

9. If the bow is stove in, close the V-berth door to make a semi-watertight compartment and gain time.
10. If need be, use the emergency pry bar and hatchet to get at a hole in the hull area.
11. Depending on the results of the assessment, begin damage control procedures.
Damage control can include:
 - Driving a wooden bung through a broken skin fitting to plug it.
 - Driving cushions, mattresses, towels into a hole from the inside and buttressing them in place with poles, rods, doors, etc.
 - Filling a hole with Marine Tex quick-acting epoxy.
 - Wrapping a split hose with self sealing tape or stretched bicycle inner tube.
 - Rigging a sail or tarpaulin outside the boat to hold it over a hole in the hull.
12. Use 2-3 people with buckets, chain-gang like, to help the bilge pumps (if manpower permits). Apparently buckets can move water faster than bilge pumps.
13. Keep an eye on the water level and batteries so as to be able to transmit a May Day or Pan Pan while you are still afloat and have electricity.
14. If, and in that case as soon as, it becomes apparent that the damage control procedures are not working, immediately begin abandon ship routine

May Day

Transmit a May Day distress call only when imminent danger threatens life or property and immediate assistance is required. Transmit a Pan-Pan ("Pahn Pahn") urgency call when the safety of a person or vessel is in jeopardy, but the danger is not life threatening. Transmission of a Pan Pan follows the same format as given for a May Day below. (See the Distress Calling article for more details on that topic.)

1. Before Each Trip

- Review radio manuals (VHF and SSB) for transmission of distress signals using their GMDSS features.
- Tape the instructions beside each radio.
- Do a radio check on an appropriate frequency.
- Review operation of the EPIRB.
- Test the EPIRB.
- Charge the hand-held VHF.

2. In an Emergency

- Transmit May Day on the SSB and the VHF while you still have power.
- Transmit using the emergency buttons of each radio according to the manual instructions.
- Transmit May Day on Channel 16 using the following sequence:
 1. May Day, May Day, May Day
 2. This is '*Vessel Name*' repeated three times, followed by Ship Station License call sign (assuming you can remember or find it)
 3. May Day
 4. '*Vessel Name*' is at Position (Lat and Long), or distance and bearing from specified landmark
 5. We are (*describe nature of emergency*)
 6. We require (*describe nature of assistance needed*)
 7. Aboard are (*describe number of people, age and condition if relevant*)
 8. We have the following (*describe safety equipment*)
 9. '*Vessel Name*' is (*give description: length, sail/power, design type, hull color, trim color*)
 10. Over
- If there is no response after a few moments, repeat the above message.

3. To Cancel a May Day

If you have transmitted a May Day or Pan Pan, and later find you no longer need assistance, you must cancel it. Here's the sequence to announce over the radio:

1. May Day
2. Hello all stations, hello all stations, hello all stations
3. This is '*Vessel Name*' and call sign
4. The time is (in 24hr format)
5. Seelonc Feenee (to cancel May Day) or Cancel Pan Pan
6. Out

Medical Emergencies

1. Prior to a Passage

- Familiarize everyone with Red Cross cheat sheets (we kept them in wall pocket above the Nav Station)
- Familiarize everyone with the medical references on board (on bookshelf in cabin port side, and Merck manual in V-berth)
- Familiarize everyone with First Aid kit and what's in it (Kit is in a clear plastic dry bag with a Red Cross on it, on the shelf under starboard porthole of V-berth.)
- Familiarize everyone with spare supplies, on-board drugs and drug indication list, and the drugstore inventory (Hanging in the Head)
- Familiarize everyone with how to get help over the radio
- Make sure each person knows the others' medical history

2. In An Emergency

- Make sure you do not put yourself into danger while responding to the situation.
- Determine if the casualty is conscious or not.
- Check the victim's heartbeat.
- Check the casualty's airways and make sure they are clear.
- If the victim is not breathing, do Rescue Breathing.
- If there is no pulse, do CPR.
- If the casualty is breathing and has a pulse but is unconscious, put him/her in the Recovery Position.
- Look for bleeding and stop it if you find it.
- Check for fractures and immobilize any.
- Once you have evaluated the casualty's condition, decide if you need help, and if so how quickly.
- Get immediate help if necessary by making a Pan Pan (announcing "Pan Pan Medico") on the VHF radio (See Distress Calls)
- If you get no response to the VHF, start listening to the Ham and Marine frequencies on the SSB (see Distress calls) and make a Pan Pan Medico call there.

Radar Plotting

It's important to practice radar plotting so that you don't make mistakes when you're under pressure or stressed. It's not that hard to do, and the practice is fun and educational. Radar plotting is the best way to avoid collision with another boat (or a squall.) We met two boats who suffered serious collisions (one with another sailboat and one with a freighter) and heard of many other such situations.

Refer to Chapter 7 for more about Radar. Here are the steps to plot for collision avoidance:

- Use a marked tongue depressor to estimate distance on the screen and a china marker to write on it.
- Keep the range the same (6 miles) while you are plotting.
- Do not change your course or speed while you are plotting.
- When you first see a target, put an "X" on the screen, and write the time beside it. If it is a big splodgy shape, it is a squall so alert the captain.
- After 6 minutes, put an "XX" on the screen where the target now is, again with the time beside it. If the target has moved nearer, it is getting closer. If it proceeds along the bearing directly towards you, you are on a collision course. Alert the captain.
- Draw a line from X to XX and extend it in your direction to well past you. This is the DRM (direction of relative motion).
- Use the 6-minute rule. Measure the distance between X and XX with the tongue depressor. When the time between X and XX is exactly 6 minutes, $\text{distance} = \text{Speed}/10$ or $\text{Speed} = 10 \times \text{Distance}$. This is the SRM (speed of relative motion.) This can be difficult to estimate in a seaway.
- Figure out the CPA (closest point of approach). This is the perpendicular distance from the DRM to us (center of the screen).
- Figure the time until the CPA by measuring how far it is from the target to the CPA, and dividing by its SRM.
- If the target is moving vertically down the screen at an SRM that is greater than ours, it is headed on a collision course towards us at a speed equal to the SRM minus our speed. Alert the captain. Do not change course until you can tell which side to go on, or you may bring yourself inadvertently closer. To gain time, slow down or stop.
- If it is moving down screen at an SRM less than ours, then we are on a collision course overtaking it, and its speed is our speed minus SRM. Alert the captain.
- If the target is not coming straight down screen at us (either approaching along its bearing on a collision course, or with a DRM that doesn't bring it directly to us), figure out its true speed and true relative course by making a vector

triangle. Draw a line from X vertically down the screen, with a length equal to how far you traveled in the 6 minutes (your speed/10). Call this point Y. Then draw a line from Y to XX. It's length x 10 gives you the true speed of the target, and its direction is the target's true relative course. Figure it's true course by adding your course to it's true relative course.

- Record in the log the target's speed and true course. If we have to contact the vessel on the VHF, we need to know its approximate true course.
- Figure out who is the stand-on vessel and who is the give-way vessel.
- Note that if a target is moving down screen towards you at your speed, then it is not moving. It is dead in the water, anchored, a buoy, or an oil drilling rig.
- If you slow down, the radar track for the target curves up the screen.

Rigging Failure

- If the engine is on, immediately put it into neutral
- Tack or cast off the sheets to luff the sails and immediately alter course so that the broken stay or shroud is to leeward:
- Port shroud - go on the starboard tack (wind on the starboard side) and tighten the port running backstay amidships
- Starboard shroud - go on the port tack, tighten the starboard running backstay amidships
- Forestay - head down wind, lead spare halyard forward and winch it tight.
- Back stay - head into the wind and tighten both running backstays.
- If the mast breaks, cut everything away to keep it from holing the boat. Try to preserve the sail if possible, and some of the rigging. It may be possible to corral the mast along the side of the boat, and lash it there well fendered and clear of the water. This requires removing spreaders etc.
- Other strategies for reacting to a dismasting include:
 - Anchor, if you're in shallow enough water while you deal with the situation.
 - Cut the mast loose and abandon it – notify the Coast Guard or issue a "Securita" to warn other boaters of a potential hazard.
 - Tow it behind, using it as a kind of sea anchor. Don't tow it with the engine on unless you're absolutely certain nothing will foul the prop.
- After a dismasting, get some sail up somehow to dampen rolling. Climb carefully up the mast steps as far as you can and make a lashing at the top to which you can secure the head of a sail. Lash the boom or the whisker pole to the remnants of the mast if needed—you will need to secure the foot of the extension very carefully and tightly at the bottom. Look in Handling Troubles Afloat for ideas.
- Rig the emergency VHF Antenna per its included instructions (hopefully you've read these ahead of time.)
- See the [Cruising Club of America's Memorandum on Offshore Communications](#) for instructions on how to rig an emergency antenna for the SSB.

Steering Failure

First thing is to determine if the problem is with the rudder or with the wheel system.

If it's the wheel system, take off the dorade just behind the helmsman's seat and put on the emergency tiller. (You've practiced this ahead of time haven't you?) Check the compass effects

If you've lost the rudder, fiddle with the sails and try to get your desired course. Move the center of effort forward or aft as seems best. Drop the main, and rig the riding sail, or storm jib, on the backstay to move the effort aft—drop the head/stay sails too if needed. To move the effort forward, use just the headsail.

If the rudder is stuck in position other than straight ahead, send someone overboard (tied to the boat with a line) with a big G clamp which has a long line attached to it. Dive down and put the clamp on the rudder about midway down. Double the lines onto the clamp. Bring the lines back, one on each side, and lead them to the jib-sheet winches. Haul on the lines to see if you can move the rudder.

If you've lost the rudder, to provide some directional push, lash the two cockpit gratings together, and then attach a long sturdy line to each side of the grating. Lead the lines through the stern, or even amidships, bridle-like, to cleats. Launch the gratings, then adjust the lines to pull the gratings to one side or the other. Alternatively, see what you can do with the windvane rudder.

Towing

Things can go badly wrong in a tow – sometimes worse than the problem that caused the tow to be necessary in the first place. Before you accept a tow, make sure the towing boat and crew really know what they are doing. Likewise, before you offer another boat a tow, be certain you can handle it and that the other boat knows how to be towed.

- Before accepting a tow, or offering one, understand the risks, costs, and liability. If you are towed, will the towed claim salvage?
- Read Chapter II (page 160) in *Handling Troubles Afloat* before setting up a tow.
- Do not rush. Think things through before engaging in a tow.
- Maintain control of your vessel. Do not let anyone else make decisions for you.
- Have a knife handy at all times ready to cut a towing line in an emergency. Think about where the cut ends will fly if it has to be cut.
- Never stand near a towline where you could get hit by it, or its end, if it parted or was cut.
- For towing in restricted waters where tight maneuvering is required, the towing boat should be tightly lashed (forward, aft, and both springs) to the quarter of the boat being towed with fenders placed between them. The stern of the towing boat should be aft of the stern of the boat being towed to permit clear passage of water over the towing (pushing) boat's rudder. The boat being towed can also assist by making rudder changes as needed.
- Practice the tugboat hitch ahead of time, and use it for your towline (except as in step 7 above). It can safely be cast off if need be.

Chapter 5 – Marine Radio

Learning the ins and outs of marine radio was not as easy as we expected. Eventually, however, by trial and error, constant study, and reference to technical resources, it began to come together to the point where eventually we could do all the things we wanted:

- listen to weather forecasts;
- participate in radio nets;
- download weather fax;
- talk to far-away friends on and or other boats;
- receive and send e-mail; and
- keep up with the news of what was happening world wide.

This Chapter is a sequence of articles I constructed as I learned more than I ever anticipated about radio, and then posted the results on the website:

- Radio Overview
- Radio Nets
- Learning Radio
- The Radio Log
- The Radio Reference Folder
- Using the ICOM 710 Marine Radio
- Also see the Distress Calling and May Day articles from Chapter 4.

We found there were not too many useful texts geared towards the recreational cruiser. We bought all we could find, and found following books to be useful:

- *Boater's Guide to VHF and GMDSS* by Sue Fletcher
- *Mariner's Guide to Single Side Band Radio* by Frederick Graves
- *Marine SSB Simplified* by Gordon West
- *ARRL Operating Manual* published by the American Radio Relay League, details ham radio procedures
- *Passport to World Band Radio* from International Broadcasting Services, Ltd. This is a great resource that is updated annually and gives the schedules and frequencies for news, entertainment, and other short wave (high frequency) broadcasts from various countries around the globe.

Also, see the Internet Resources section of Chapter 9 for useful links on this subject.

Radio Overview

An understanding of radio, and the ability to transmit and receive information on marine and/or ham radio frequencies, is an essential safety feature on a cruising sailboat. When we moved aboard, we knew how to use an AM-FM radio and the VHF. The need to get weather information when far from land, download weather faxes, the desire to have on-board e-mail capability, and to communicate with other sailors forced us to grapple with purchase, installation, and use of a Single Side Band (SSB) radio.

Here are some things to know about as you attempt to unravel and master the mysteries of marine radio. We learned these as we studied a variety of sources, and from observation and experience. On purchasing and installing an SSB, we began to study for the exams to become amateur ("ham") radio operators. This involved passing, first, the Technician Class exam, then a 5 words per minute Morse Code test, and then the General Class exam. It was well worth the effort.

VHF-FM (Very High Frequency-Frequency Modulated) radio is cheap and used in coastal navigation. VHF is considered 30-300 MHz (marine band and DGPS). Channels: 16, 22 are Coastguard. 9 is recreational vessel to commercial shore. 67, 72 are between recreational and commercial vessels. VHF-FM frequencies are 156/157 MHz which is above normal FM radio. 68, 69, 71, 72, and 78 are for recreational users. 6, 13, 67 are for safety and navigation. DGMS is on 70 (digital use only). Marine operators are on channels 24-28 and 84-88. Note that the use of channels must relate to the needs of boat. VHF is line-of-sight communication and therefore depends on the height of your antenna and obstructions. 20-40 miles is about average.

HF (High Frequency or "Shortwave") radio is for high seas and coastal marine purposes. HF (the marine band, called **ITU channels**) are at 3-30 MHz and produce long-range wave propagation. Users must know which frequencies are available and what their range is. HF radio can travel thousands of miles. Range is affected by transmitter power, antenna gain, but most importantly by atmospheric conditions. Channels (transmission frequencies) are selected according to time of year, time of day and how far you want to transmit. **Single Side Band (SSB)** is the type of HF radio used by boaters and the instrument manual contains a complete list of the ITU channels, and should also identify high seas telephone channels.

The HF band includes marine frequencies and also includes frequencies allocated to the amateur service. On the SSB the user can program these frequencies into a set of User Channels. To use the reserved **amateur (ham) frequencies** the user must have an Amateur Radio License.

Use of the radio is strictly controlled in the USA by the **FCC**, and there are licensing requirements both for the user and for the station.

MF (Medium Frequency) is 2-3 MHz and has range of 75-150 miles during the day. MF radiotelephones are SSBs. Some SSBs can receive Weatherfax, Navtex, or Sitor broadcasts.

An emergency antenna for the **SSB** should be 23' long.

Commercial AM radio transmits quite a long way (several thousand miles at night) and you can sometimes pick up weather info here. Also, if you have a cheap AM radio you can use it as a direction finder.

The use of amateur radio (ham) equipment at sea is called **Maritime Mobile (MM)**.

To use a computer with a radio, you must connect the SSB and computer using a "**Terminal Node Connector**" (radio modem) and have appropriate software.

To spell out words on the radio, for each letter use the internationally recognized system: Alpha, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliet, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whisky, X-ray, Yankee, Zulu.

Satellites have revolutionized marine communications. Traditional radio relied on ionospheric reflection and propagation. Geostationary satellites provide essentially line-of-sight transmission capability to most of the earth's surface. They can transmit general information to all ships, or they can relay traffic to a specific vessel or shore station. The IMO (International Marine Organization) organized **INMARSAT** (the International Maritime Satellite Organization) to coordinate and regulate satellite use. INMARSAT has one member from each country. The US is represented by Comsat. INMARSAT was incorporated in 1998 into **SOLAS** (the International Convention for Safety Of Life At Sea.)

As part of INMARSAT, ships now transmit weather information to government agencies, vastly improving the amount of data available to weather forecasters, and thus the forecasts.

GMDSS (the Global Marine Distress and Safety System) is slowly going into effect worldwide.

Radio Nets and Broadcasts

In addition to government marine weather broadcasts, cruisers can listen to any of the numerous volunteers who spend a significant portion of their time managing a number of radio "nets" which provide useful - even essential - information to cruisers. Radio nets also help cruisers keep in touch with friends and family. Many of these nets are activated during emergencies and will broadcast boat-watches for overdue vessels. Nets also help find cruisers whose families urgently need to make contact with them.

Note that the times given are in Universal Coordinated Time (UTC) and some nets move forward an hour when daylight savings time goes into effect in their main area. For additional nets, see the Appendix at the back of Jim Howard's excellent Handbook of Offshore Cruising, where there is a list of over a hundred ham radio maritime mobile nets around the world.

This list of nets and broadcasts was current to the best of our knowledge as of the end of our cruising period (summer, 2004). However, nets do change frequencies (usually up or down a few Hz) and times so we don't guarantee the accuracy of this list and are no longer actively maintaining it. However we do make changes when people email them to us.

1. Weather Nets

<i>Net Name</i>	<i>Frequency</i>	<i>Time</i>	<i>Comments</i>
Caribbean Emergency and Weather (Ham)	7162.0 LSB	1030 UTC	Trinidad, Rosemond, J69BB
East Caribbean Weather Net (Ham)	3855.0 LSB	1030 UTC	Eric Mackie 9Z4CP, Trinidad
BASRA Weather	4003.0 USB	1100 UTC	Carolyn, Nassau
Caribbean Weather (Ham)	7241.0 LSB	1115 UTC	George Cline, KB2G, St. John
Bahamas Weather (Ham)	7096.0 LSB	1120 UTC	Bahamas
Caribbean Weather (Ham)	7086.0 LSB	1130 UTC	George Cline, KB2G, St. John
Caribbean Weather Center -- Bahamas/East US coast	8137.0 USB	1130 EST or EDT	Chris Parker, Bel Ami, Miami/Tortola.
French Cruisers and Weather Net	6945.0 USB	1200 UTC	Maurice
Caribbean Weather Center-- Caribbean)	8104.0 USB	1230 UTC	Chris Parker, Bel Ami, Miami/Tortola.
Waterway Net (Ham)	7268.0 LSB	1245 UTC	Florida
Caribbean Weather Center -- Caribbean/Atlantic	12359.0 USB	1300 UTC	Chris Parker, Bel Ami, Miami/Tortolai
Caribbean Weather Center -- Atlantic	16531.0 USB	1330 UTC	Chris Parker, Bel Ami, Miami/Tortola.
Southbound II	12359.0 USB	2000 UTC	Herb Hilgenberg
Caribbean Cocktail Weather (Ham)	7068.0 LSB	2030 UTC	George Cline, KB2G, St. John
East Caribbean Weather Net (Ham)	3855.0 LSB	2230 UTC	Eric Mackie 9Z4CP, Trinidad
Caribbean Emergency and Weather Net (Ham)	3815.0 USB	2230 UTC	Trinidad
Trinidad & Tobago Amateur Radio Society (Ham)	7159.0 LSB	as needed	during active hurricane or emergencies
Hurricane Net (Ham)	14325.0 USB	as needed	during active hurricane

2. Weather Broadcasts

[NOTE: since this page of our website is no longer actively maintained, cruisers are advised to check with the weather service for changes to this listing.]

The US National Weather Service broadcasts marine weather forecasts on 4426 kHz, 6501 kHz, 8764 kHz, 13089 kHz, and 17314 kHz. Offshore and high seas forecasts for the Atlantic and Caribbean begin at 0330 UTC, 0500 UTC, 0930 UTC, 1530 UTC, and 2130 UTC. Weather forecasts are also transmitted continually over the VHF (Weather Channels 2-5) along the east coast of the US. Storm warnings are broadcast on WWV (5000mHz, 10000mHz, 15000mHz, and 20000mHz) at 8 minutes past each hour. BBC Radio 4 shipping forecasts are broadcast at 0048, 0535, 1201, and 1754 local time on 198 kHz (1515m). Radio France International broadcasts a 24-hour weather forecast at 1140 UCT daily on 6175kHz (English Channel, North Sea, Bay of Biscay), on 11700kHz, 15530kHz, 17575kHz (North Atlantic east of 050 degrees West), on 11845kHz (West Africa to Gibraltar), and 15300kHz (Equator to 27 degrees North).

For a complete list of worldwide weather broadcasts, see NOAA's Worldwide Marine Weather Broadcasts or the British Admiralty List of Radio Signals.

3. Other Nets

<i>Net Name</i>	<i>Frequency</i>	<i>Time</i>	<i>Comments</i>
Local Cruisers Net	VHF 68	7:30am local time	Grenada (Monday, Wednesday, Friday)
Local Cruisers Net	VHF 14	7:30am local time	Sint Maarten (daily)
Local Cruisers Net	VHF 72	8:00 am AST	Puerto La Cruz, Venezuela (Mon - Sat)
Local Cruisers Net	VHF 68	8:00am local time	Trinidad (daily)
Local Cruisers Net	VHF 68/72	8:00am local time	Luperon (Sunday, Wednesday)
Local Cruisers Net	VHF 68	8:15am local time	Abaco Islands, Bahamas (daily)
Seafarer's Net (Ham)	14313.0 USB	0300 UTC	Pacific
Pacific Seafarers (Ham)	14300.0 USB	0325 UTC	Pacific Ocean
S. African Maritime Mobile Net (Ham)	14316.0 USB	0630 UTC	South Atlantic
Med Maritime Mobile Net (Ham)	7085.0 USB	0700 UTC	Mediterranean
Caribbean Maritime Mobile Net (Ham)	7241.0 LSB	1100 UTC	Lou Bean, KV4JC
Maritime Net (Ham)	3770.0 LSB	1100 UTC	NE Canada
S. African Net (Ham)	14316.0 LSB	1130 UTC	S. Africa/Indian Ocean
S. Atlantic Net (Ham)	21325.0 LSB	1130 UTC	South Atlantic
Maritime Mobile Net (Ham)	14300.0 USB	1600 - 0200 UTC	Worldwide (1700 - 0200 in the winter)
Canadian Cruisers Net	8182.0 USB	1200 UTC	Caribbean
Mississauga Net (Ham)	14121.0 USB	1200 UTC	E Canada and Atlantic
Caribbean Safety & Security Net	8104.0 USB	1215 UTC	Melody on S/V 2nd Millenium
Trans-Atlantic Net (Ham)	21400.0 USB	1300 UTC	Trudi, 8P6QM. This net is for daily checkin by boats crossing the Atlantic.
German Cruisers	8140.0 USB	1300 UTC	Caribbean
Central American Breakfast Net (Ham)	7085.0 LSB	1300 UTC	Central America
Panama Connection	8107.0 USB	1330 UTC	Central America
Cruiseheimers	8152.0 USB	1330 UTC	Bahamas and Caribbean
South African Cruisers	8116 USB	1330 UTC	Caribbean
Sonrisa Net (Ham)	3968.0 USB	1400 UTC	Mexico
Baja Net (Ham)	7233.5 LSB	8am Local Pacific time	California and Baja
Chubasco Net (Ham)	7204.0 LSB	1530 UTC	Mexico
The Kids Net	8122.0 USB	1800 UTC	West Atlantic and Caribbean
Manana Net (Ham)	14340.0 USB	1900 UTC	Mexico to Hawaii
Pacific Maritime Mobile Net (Ham)	21402.0 USB	2200 UTC	Pacific/Indian Oceans

4. Netiquette

Users of radio nets should be aware of the generally accepted etiquette for using and participating in radio information and contact nets. While there are no hard and fast rules, the following suggestions may be helpful.

- Before participating (transmitting) during a net, listen to the complete net a few times so you understand its format.
- Each net is managed by someone acting as Net Control whose job it is to act as MC, chair, or facilitator of the net activity. On ham nets, the net Control also logs each caller's callsign and name, plus any other information offered. Look for opportunities to substitute for these dedicated volunteers, to give them an occasional day off.
- Some nets are organized solely for the purpose of allowing people to check in, or make contact. When trying to make contact during such a net or contact period, listen to make sure no-one else is talking, then state the call sign of the station you're trying to reach loudly, slowly and clearly, twice, then state your own call sign, once. Hold the microphone close to your lips. If you hear no response, wait three minutes and try again. Do not keep calling and calling. On VHF and SSB marine channels, the call sign is theoretically the Ship Station License number, but common usage is the boat's name. On the ham frequencies, it is the callsign assigned by the FCC when you passed the ham exam. Once you have made contact, you should switch to another frequency to leave the original calling frequency open for other contacts and checkins.
- Sometimes the net control cannot hear someone trying to talk on a net. You may be able to help by serving as a Relay.
- Before speaking on any radio, listen for a few seconds to make sure you don't "step on" someone else.
- You may only transmit on ham frequencies if you have the appropriate ham license - a license is not needed to listen, however. Be aware of which class of ham license authorizes you to use which frequencies. Note that the ham frequencies may be used by anyone in case of a life-threatening emergency if no other frequencies are available. Note also that there are regulations that control transmission by foreign cruisers on ham bands in various countries.
- If you use radio for e-mail transmission, avoid doing e-mail at the times of scheduled radio nets or weather-fax broadcasts. Your e-mail transmission signal is very powerful and may well obliterate net activity and/or the weather-fax signal.
- Know the VHF channels that can be legally used by cruisers. There are more restrictions in the US than in Caribbean countries. Be aware that under the GMDSS Channel 70 is for digital use only, and never used for voice transmission.

Learning Marine Radio

Here is an explanation of the process we followed, the lessons we learned, and the struggles we had with installing and learning how to use marine radio. We offer this in the hope that it might be helpful to others faced with that task.

When we bought *Callipygia*, we knew how to use a VHF radio, and an AM-FM radio - and that was about it. Our boat was equipped with an ICOM IC-M45 VHF, an AM-FM radio, and a ham radio. After we were finished with her, she was equipped with the same Icom VHF, a Standard Horizon HX460S handheld VHF, a Sony 50XW4 car radio with a 10-CD player, a Radio Shack pocket AM-FM radio, an ICOM IC-M710 SSB, a Pactor IIe terminal node connector, and a pair of TechLink "family" radio headsets.

The cost of upgrading the radio equipment made a big hole in the boat kitty, one we hadn't anticipated. However, we deemed it money well spent because once we learned how to use everything we could:

- listen to weather forecasts;
- participate in ham and marine Radio Nets;
- download weather fax;
- talk to far-away friends on other boats or on land;
- get and send e-mail;
- listen to world-band radio;
- listen to local broadcasts and our CD collection;
- talk to each other from foredeck to cockpit and from masttop to deck without yelling; and
- get a bearing on a local radio station.

The one thing we never figured out was how to get real-time satellite pictures. Note that this article includes information that was current as of the end of our cruising period (summer 2004). Changes in laws and requirements since then are not covered.

1. Regulations and Licensing

It took a while to understand the licensing requirements. A presentation by Joe Nunemaker, KD3VR, of BayMaster Electronics in Lanham, MD, (301-577-0434) at Nautech's Offshore Passagemaking Seminar in early 2001 was helpful. Joe provided copies of the FCC forms, which can also be downloaded from the FCC website.

As we understood the requirements, a boat needs a Ship Station License if it has an SSB radio on board, and its crew needs Restricted Radiotelephone Operator Permits to operate the SSB using the marine band of frequencies. The RRO permit is also needed to operate a VHF in foreign waters. The Ship Station License is good for 10 years. The Restricted Radiotelephone Operator Permit does not expire.

Filling out the forms is quite confusing as there are separate forms for application and to make payment. However, the FCC website does provide a helpline which can be used by phone to answer questions. To transmit on the most widely used ham frequencies on the SSB, you need General Class Licenses for Amateur (ham) Radio - no license is needed to listen, however. To use the ham frequencies in foreign waters, a reciprocal license may be needed from the foreign government. The General Class License is good for ten years. To get a General Class license you must first obtain a Technician class license, and complete a test of Morse Code at 5 words per minute.

Only commercial, FCC accepted radio equipment is authorized for use in the marine frequencies - however, such equipment can also be used on the amateur (ham) frequencies. Amateur (ham) radio equipment, on the other hand, can only be used in the amateur frequencies, and may not be used in the marine frequencies.

2. Using the VHF Radio

Since we were already familiar with using the VHF, this didn't present too many problems. We had to learn which channels are authorized for use by cruisers, and that authorized use varies somewhat from country to country. Regulations in the US are restrictive. We purchased a handheld VHF radio as backup, and to use in the cockpit while underway, or to go with a crew member in the dinghy. This radio was recharged from the boat's batteries, and got soaked a few times without malfunctioning. In many Caribbean countries the VHF operates as a telephone for local residents and cruisers alike. People listen in on each other's conversations without compunction - jokingly referred to as the "We HF". Morning nets on the VHF are common, and a great way for cruisers to share information.

3. Single Side Band (SSB or "Shortwave") Radio

Without knowing really what we were doing, but on Joe Nunnemaker's recommendation, we replaced the ham radio that came with *Callipygia* with an ICOM-M710 marine SSB in September, 2001. Joe installed the radio (definitely not a do-it-yourself task) using the existing backstay antenna, and replaced the ground. The purchase and installation was a major and unanticipated expense, but we never regretted it for a minute. We struggled up the learning curve with this radio, since the user manual is quite cryptic. At the SSCA Annual Meeting in Melbourne in November, 2001, the ICOM representative recommended we call ICOM and ask for a copy of Gordon West's primer on Marine SSB Simplified and we bought Frederick Graves' Mariner's Guide to Single Side Band Radio. Eventually, through reading these books, the instruction manual, and a lot of trial and error, we got the hang of it, and learned how to program the User Channels to our satisfaction.

We spent many hours just listening to the SSB, learning what kind of traffic could be found on which frequencies, at what time of day. We developed a Listening Log in the Radio Notebook. Once we finished programming the User Channels, we made a reference sheet on which we marked programming changes. We allocated the 160 user channels for: WWV (time ticks and weather); ham nets; marine nets and talking channels; weatherfax; e-mail; and world-band radio. We eventually became familiar with what was available in the ITU

channels since many of these are used for marine weather, marine nets and talking frequencies. While we were in Marsh Harbour in the Bahamas in early 2002, Jim and Julie Lyons of S/V Iolani were organizing a series of "WD-40 For the Mind" seminars for cruisers. One of the topics while we were there was radio, and it was excellent. At that seminar, we learned about the book *Passport to World Band Radio* which we bought. Wow! Did that open our eyes to all the programming available to us on the SSB. We often listened tonews and other broadcasts in English from all around the globe.

When he installed the SSB, Joe Nunnemaker told us that we should get our ham radio licenses. Through the ARRL we bought the study guides for the Technician and General Class licenses, and a set of Morse code training tapes. We took and passed the Technician exam at the SSCA meeting in Melbourne, and in April, 2002, we took and passed the next level General Class license exam in Laurel, MD. We learned some useful things about radio while studying for these exams, but it was mostly rote learning. We drilled each other on Morse Code. We drilled each other on regulatory issues, which frequencies could be used by whom for what, modes of communication, safety factors in using radio, antenna features, radio wave propagation characteristics and what affects it, radio etiquette, etc., etc. We bought the ARRL's Operating Manual and became proud of our membership in the ham radio community.

I spent quite a bit of time listening/participating in various Radio Nets. I discovered that these were a wonderful way of getting answers to questions, obtaining help when needed, finding out what's going on in various cruising locations, and generally keeping in touch with other boats.

An emergency antenna was carried on board so that the SSB and/or VHF could still be kept functional in case of a dismasting or other loss of radio antenna.

4. E-mail from the Boat

At the SSCA meeting in Melbourne (November, 2001) we attended a daylong seminar put on by the Winlink development team and spoke to a representative of Sailmail. Winlink and Sailmail are close cousins. They are e-mail systems for cruisers using the amateur (ham) and marine frequencies respectively. To use Winlink, we learned we needed a General Class ham licenses so we signed up with Sailmail for a year to get ourselves started and received diskettes with the Airmail software on it. At the same SSCA meeting, and again on Joe Nunnemaker's recommendation, we bought a Pactor IIe terminal node connector (radio modem) and the necessary cabling from Mike's Electronics in Ft. Lauderdale (954-491-7110). The Pactor IIe allows a computer to transmit and receive digital information over the radio. Plugging the Pactor into the radio and connecting it to the laptop was the easy part. Installing the Airmail software was also simple. Then we programmed the Sailmail frequencies for three of its radio stations into the SSB User Channels, remembering to make them 1.9 hz below the listed frequencies. But then it took quite a bit of trial and error, and a call to Jim Corenman (Airmail's developer) before that first e-mail message went out. But what a thrill! Jim Corenman, and the folks at Sailmail and Winlink (all volunteers) provide a great service to the cruising community. By September of 2002, we had got our General Class licenses, upgraded Airmail to the Ham version, and

signed up with Winlink as our e-mail provider. Then we could automatically receive weather forecasts along with our e-mail every morning.

The differences between Sailmail and Winlink were:

- Winlink users need to have a General Class ham radio license, however no license beyond the Ship Station license is needed to use Sailmail;
- There is an annual fee to use Sailmail, no fee for Winlink;
- Because Sailmail uses marine frequencies, business transactions may be conducted through it unlike with Winlink where no business may be conducted because it uses the Amateur frequencies;
- Winlink users are allocated 30 minutes per day through each PMBO (radio station in the Winlink network) but Sailmail users are limited to
- 10 minutes per day total;
- Winlink users can receive by e-mail a wide range of weather forecasts and charts, and while it is possible to get some weather information through Sailmail, this is much more limited;
- Winlink users can automatically update their position in the Winlink website so that family and friends to track their movements; and
- It is simple to send and retrieve Winlink e-mails over the Internet using the Telnet feature of Airmail if you leave the boat for a while.

In the fall of 2003, at the same time as we upgraded the Airmail software, we downloaded a firmware upgrade to convert the Pactor IIe into a Pactor III radio modem and paid for a license for it. All the instructions for doing this came from the folk at Winlink. As a result, email went much faster and we received Internet weather fax pictures along with the email messages and text forecast each the morning.

5. Weather Fax

After the SSB was installed, but before we bought the Pactor IIe, we bought Coretex Weather Fax for Windows. However, no matter what we did we just couldn't get it to work so we returned it. After we had the Pactor IIe installed, we downloaded the JVComm32 shareware which is what used for Weather Fax. It has a bit of a learning curve, since there is not much in the way of user help information. However, once you've learned its tricks by trial and error, it's pretty easy to use. We downloaded the weather fax schedule and frequencies from the Ocean Prediction Center. We programmed the frequencies into the SSB, remembering to subtract 1.7 Hz from the center (advertised) frequency. To improve our skills at interpreting weather maps, we read Michael Carr's *Weather Predicting Simplified* and Mike Harris' *Understanding Weatherfax*. Two of the Nautech seminars on weather were very helpful. One was presented by Michael Carr and the other by Lee Chesnau, of the Ocean Prediction Center. Lee handed out a very helpful article from the magazine *The Mariner's Weather Log* entitled "Mariner's Guide to the 500-Millibar Chart."

6. AM-FM

We bought a high quality Sony car radio with 10-CD player and installed it with all the other radio equipment at the nav station soon after we acquired *Callipygia*. We had a custom box built for it so it could be screwed down with all the other radio equipment. It was wired into the boat's 12-volt electrical system. This radio was used for listening to local radio stations, and to CDs. We also bought an inexpensive portable AA battery-operated AM radio as part of our emergency equipment. The antenna of this radio can be used as a radio detection finder to get a rough bearing on a nearby radio station, if needed.

7. Family Radio

These are basically high-powered walkie talkies. We bought a battery-operated set built into headphones (made by TechLink) at the 2001 SSCA annual meeting in Melbourne, FL. We used these to talk to each other from foredeck to cockpit during anchoring activities, and from the mast-top to the deck when Bill went up the mast. These headsets made communications at these times easy and low key and we never had to resort to yelling - a major achievement. We learned a few hand signals, but found it much more useful to be able to talk and consult with each other about issues using the headsets. We planned to buy a pair of handheld walkie talkies to use if/when we sailed back to the US since it is not legal to use a handheld VHF there on shore.

The Radio Log

While cruising on Callipygia, we attempted to maintain a radio log as recommended by the ARRL and the FCC.

Our Radio Log was a 9 1/2 inch by 6 inch spiral notebook where information was about the installation and adjustment of the radios, and their use, was recorded. Copies of the Ship Station License and our General Class (Ham) licences were pasted on the inside back cover along with our Restricted Radiotelephone Operator licenses. A Table of Contents was written on the inside front cover, corresponding to the way the notebook was organized, with tabs, as below:

1. Installation Notes. This was a chronological log of all radio installation and maintenance work, including when it was done, what was done, and who did it.
2. Transmission Log. This was a log of transmissions on the Ham frequencies of the SSB radio. While no longer required by the FCC, it is recommended as a good and helpful practice to maintain this. We kept a separate section of the transmission log for transmissions to the Winlink radio e-mail. This was handy, since it provided data for trouble-shooting email transmission difficulties.
3. Channel Reference. We originally kept this list in the log, but later moved it to the Radio Reference Folder.
4. Listening Log. This was a list of dates/times, and frequencies, when we listened to the SSB and what was being broadcast. This was primarily used when we were learning how to use the radio. Later, we only recorded items when something useful and new turned up.
5. Winlink User Notices with information about changes to the Winlink system.
6. Morse Code transcriptions - a place where we recorded what we heard in Morse Code, to try to get a bit of practice periodically.
7. Miscellaneous Training Notes. Notes from seminars, books, etc., to help improve our understanding and use of radio resources.

This Log lived beside the radios at the nav station and was used pretty much every day for recording transmissions and looking up channel references.

The Radio Reference Folder

The Radio Reference Folder was a fat orange folder that sat by the Nav Station on *Callipygia*. In the front of it there was a Table of Contents to help us find the information we needed while using the SSB. Here is the list elements (with a short description of the element) that we pasted as a Table of Contents on the cover of the folder.

1. Using the SSB: a printout of the checklist on using the ICOM M710 Marine Radio (see following article.)
2. Propagation Diagram: This was the inside front cover of Frederick Graves book "Marine Guide to Single Side Band", which has a great diagram of propagation by frequency, time of day, and season.
3. Radio Distress Signals: This was the checklist taken from our Emergency Procedures (See Chapter 4.)
4. Channel Reference - Group List. This was a spreadsheet printout of all 160 User and some ITU Channels, in frequency order within Groups. The Groups were:
 - Get Help: Channels for Coast Guard, Distress and Safety, WTO Radio Operator, etc
 - Government: Channels for FEMA, WWV, etc.
 - Air: Channels shared by marine and air users, air distress channels
 - Ham: Channels programmed for commonly used ham frequencies and radio nets
 - Winlink: Channels programmed for connecting to Winlink PMBOs (we program all Pactor III frequencies for 8 PMBOs)
 - Weather: Channels for picking up voice weather broadcasts
 - Weather Fax: Channels for picking transmissions of Weather Fax
 - Ship to Ship: Channels commonly used by cruisers for talking to each other
 - World Band: Channels to pickup the BBC, Radio Canada Internationale, Voice of America, Radio Netherlands, etc.
 - ITU Channels: A summary of the marine ITU groups.
5. Channel Reference - Frequency List. This was the same data as the in the Group List, except sorted in frequency order to show quickly all the frequencies programmed for a particular wavelength
6. Radio Schedule: A lengthy listing of weather broadcasts, weather fax, nets, and news broadcasts--their times and frequencies. Sorted in UTC order. Regular transmissions were highlighted, and the daily radio schedule was developed from this list.
7. ITU Channels: A printout of all the ITU channels that came with our SSB radio.

8. World Band Schedule: A comprehensive list of world band transmissions that were of interest to us in English, in UTC order. Taken from the book "Passport to World Band Radio"
9. The ARRL Band Plan: showed which frequencies can be used for what purposes with which class of Amateur Radio License.
10. Cruising Club of America (CCA) Memorandum on offshore communications . This includes information on how to operate the ICOM M710 and 710RT. Much better than ICOM's instruction manual. See the following link:
http://www.cruisingclub.org/seamanship/seamanship_offshore.htm This also gives instructions for rigging an emergency SSB antenna in the event of a rigging failure.
11. WX Comm and Navigation written by Jack on Whoosh describing experience and lessons learned on passage from the Azores to the UK and Northern Europe. See [<http://www.svsarah.com/Whoosh/WhooshCruiseWxCharts.htm>]
12. Instruction Manual that came with our ICOM M710 SSB radio (not helpful to novices)
13. Winlink PMBO List: A printout of the Airmail PMBO (station) frequency list
14. Ocean Prediction Center Guide to Radio Fax printed off the Internet
15. Waterway Net Guide: the procedures issued by the Waterway Net--a handy guide to Ham Radio Net methods

We intended to put all of this stuff into a three-ring binder at some point, but we never did because the folder arrangement worked quite satisfactorily for us. It was a lot of work to become familiar with the SSB and figure out how to effectively use it - but the payoff was great.

Using the ICOM M710 SSB Radio

In the Radio Reference folder (see previous article) that we kept near the Nav Station we kept a checklist intended to walk someone not familiar with the radio through the steps so they could use it to communicate with the Coast Guard or other cruisers in case of an emergency. Using the SSB can be intimidating and/or confusing for first timers, so it's good to have everyone on board run through the routine periodically.

Here were the steps for using our ICOM M710 SSB Radio:

1. Turn on the radio by pressing the power button on the lower left corner. Adjust volume knob for a slight "hiss".
2. The display will indicate channel number, frequencies, or words – depending on how it was set at last use.
3. Frequencies have Decimals and may show on the top and bottom row, or not at all. Channels are 1-4 digits, no decimals, and may have a hyphen between digits.
4. To send an automatic distress call, see the Distress Calling and May Day checklists (See Chapter 4 – The "What If's".)
5. If the top row of the SSB display has Frequencies on it, press the "Ch/Freq" button below the numeric key pad. This changes the display to show channel numbers on the top row. Pressing "Ch/Freq" again switches the display to show the receiving (Rx) frequency on the top, with the transmission (Tx) frequency underneath it. The "Ch/Freq" key toggles back and forth between the two displays.
6. With a channel number on the top row, press "1" on the key pad, then press the "Rx" button below the keypad. This gets you on 2182.0kHz, the Hailing and International Distress frequency.
7. Listen to the channel so see if it is being used. Take down the black microphone handset and hold it an inch from your lips. If you have a life-threatening situation, break in with your "May Day", otherwise wait for a break in conversation. If someone is talking, someone else is listening. Press the button on the side while you talk, and release it when you are finished. Wait a few moments for a response.
8. To call the Coast Guard, pick an appropriate channel (frequency) from the list below: With a channel number showing on the top row, press the channel numbers on the numeric key pad, and then press "Rx" to enter it.
9. NOTE that "USB" should show up on the upper right hand corner of the display. If it doesn't, press the "Mode" button under the lower left corner of the display until you get it to show.

<i>Channel</i>	<i>Receive</i>	<i>Transmit</i>	<i>Range (Day)</i>	<i>Range (Night)</i>
424	4426.0	4134.0	2-300 miles	8-1,500 miles
601	6501.0	6200.0	400-500 miles	1,000-2,000 miles

816	8764.0	8240.0	500-1,000 miles	1,000-3,000 miles
1205	13089.0	12242.0	1 to 3,000 miles	unreliable
1625	17314.0	6432.0	3 to 5,000 miles	unreliable

10. Note that these are the frequencies that the Coast Guard uses to transmit weather broadcasts so if you hear one, wait until it is over before you try to call.
11. Follow the instructions on the Distress checklist and make a May Day or Pan Pan call on the frequency you select.
12. If you are unable to get the Coast Guard, try one of the Safety and Hailing channels until you find one with someone talking on it. With a channel number showing on the top row, press the channel numbers on the numeric key pad, and then press "Rx" to enter it. Wait until there is a break in conversation before transmitting your message or request unless it is a May Day.

<i>Channel</i>	<i>Receive</i>	<i>Transmit</i>	<i>Range (Day)</i>	<i>Range (Night)</i>
4-1	4125.0	4125.0	2-300 miles	8-1,500 miles
6-1	6215.0	6215.0	400-500 miles	1,000-2,000 miles
8-1	8291.0	8291.0	500-1,000 miles	1,000-3,000 miles
12-1	12290.0	12290.0	1 to 3,000 miles	unreliable
16-1	16420.0	16420.0	3 to 5,000 miles	unreliable

13. If none of these work, start listening on some frequencies commonly used by other cruisers. Try Channels 43-89. Start listening on one of these. You can move up or down one channel by turning the right hand large knob (the Channel Selector) clockwise or anticlockwise. Also try some more of the general marine channels: 4-x, 6-x, 8-x, 12-x, 16-x where "x" is 2 through 9.
14. If none of these work, start listening on some of the Ham frequencies (Channels 13 - 38). You may make a May Day call on a ham frequency even if you don't have a Ham license, but only if you cannot reach anybody else.

Chapter 6 – Navigation

This Chapter barely scratches the surface of piloting and navigation. That topic takes years of study to become proficient. Before we set off in *Callipygia*, I took all four navigation classes offered by the Power Squadron as well as those offered through the Maryland School of Sailing and Seamanship. There is no substitute for proper training on this subject. A cruiser should know how to do inland, coastal, and offshore navigation before taking off. Skill at celestial navigation is highly educational, useful, fun and adds to enjoyment of elements in the sky. On an ocean passage it could be essential.

While we were cruising we found that working on navigation skills, and on understanding and interpreting weather, were among the most fascinating and satisfying aspects of the cruising life. We did not rely on the GPS until we felt competent at piloting and navigating without it. We also learned that radar was a valuable tool for coastal navigation.

In our beginning days, while we may not have known what we were doing, we always knew where we were. Good job because, if navigation or the weather goes bad or gets ignored, a boat and its crew can get into trouble fast. We know several to whom that happened. It's too easy to make fateful mistakes when one is tired or seasick. We considered navigation so important that we always checked each other's work as we planned our navigation prior to making a passage. A painless way of putting points into the Black Box, we thought.

What's given in this Chapter are articles showing how we did certain routine navigation tasks, and a cautionary tale that reminds cruisers that charts may not always be accurate.

- The Deck Log
- The Navigator's Notebook
- Chart Management
- Sample Passage Plan
- Bump in the Atlantic

The Deck Log

Our Deck Log was the official record of *Callipygia's* travels. We developed the format based on that used when I (twice) completed the American Sailing Association's Advanced Coastal Cruising course with the Maryland School of Sailing and Seamanship. One of these training trips was a circumnavigation of the DelMarVa peninsula, and the other went from Norfolk, VA to Mystic, CT. The initial format of *Callipygia's* Deck Log was modeled on the format used in those courses, with modifications based on readings from various texts on seamanship.

In January, 2003, in finalizing the Ship's Logs for this website, I reviewed what we were doing and made some further changes to facilitate the organization of log information so that it more easily yielded useful information for describing our travels and, potentially, for future passage planning. Four months later, the format was revised again so that the log was easier to complete and keep in the cockpit.

It should be noted that the Deck Log is the legal document of any ship's control, course, and actions in the event of an accident. We were amazed (?horrificed) to discover that some cruisers maintained minimal, or no, Log - or for that matter any a record of their trips other than a few markings on some charts.

1. Log Format

The first few pages of *Callipygia's* Deck Log were reprints of the Power Squadron's Junior Navigation training manual on maintaining a log. Essentially, the dictum is to fill in the log every hour on the hour, while making additional entries whenever there is change of speed or course. Once the log had been entered, then the boat's position was marked on the chart. Having the log entries to refer back to is an essential safeguard in the event charting mistakes are made - as can easily happen when crew are tired. Also, we found that having the log to fill out helped whoever was on watch since it gave him/her a goal and something to do, especially at night when things might otherwise be a bit boring (we hoped). We found it invaluable to maintain this Log, especially when the trip was challenging and we got tired.

We experimented with various formats for the Deck Log. We started out with printed tables we made on the computer, and then bound in a spiral binding. Then we switched to a spiral notebook with hand drawn pages, in 3 sections. Eventually we settled on loose pages with a table printed on each side and stapled together so each page of the log was 2 pages across. We stapled together 12 of these pages at a time, and kept them, and a pen for writing, in a plastic sleeve to keep it dry in the cockpit. This worked well for us. We reduced the columns to those we felt were essential--we found that in earlier versions of the Log we had columns to fill out that we consistently ignored. We also maintained a separate set of stapled sheets of paper that we filled out, periodically, giving a summary of each daily trip information from the Log. This summary gave a quick picture of each passage, and in fact of each year's travels. As the stapled sets of log sheets were used up, they were clipped together with a big alligator clip and kept for reference purposes.

After entering these items in the Deck Log, whoever was on watch marked our position on the relevant chart and advanced the green "flag" on it. This flag was a small acute triangle cut out of colored masking tape that was kept on the chart close to, and pointing at, our last logged position on the chart. [We used green for the boat's current position flag, and blue flags to mark key waypoints. We placed the blue flags on the charts before we set off as we did our passage planning.]

2. Log Content

The Day/Date was filled out at the top of every page, as well as the starting and ending location of the trip. The first line was completed at the time of departure, noting the engine hour reading in the Comments line. Subsequent lines were completed each hour, or if there was a change in course or speed. The following elements had columns on the left-hand page:

- Time (24 hr notation, e.g. 1015)
- Latitude (GPS reading of degrees, and minutes to 2 decimal places), or name of Aid to Navigation or Waypoint reached. If DR or celestial position, so noted.
- Longitude (GPS reading of degrees, and minutes to 2 decimal places), If DR or celestial position, so noted.
- Water depth
- Water temperature
- Estimated average compass course for the prior period
- Estimated average speed for the prior period (both boat speed through the water and SOG from GPS)
- Distance traveled during the prior period and/or Log reading
- Battery reading
- Barometer reading
- Swell direction, height, and period
- Apparent wind direction
- Apparent wind speed

The right hand page had columns for the following elements:

- Time
- Bilge status (dry, # inches, or count of strokes to dry)
- If engine on, average RPM for prior period.
- Column for putting a check mark if radar on
- Column for putting a check mark if navigation lights are on (and if so, checked to make sure still working)

- Column where "A" is put if autopilot is steering, or "W" if Monitor Windvane is steering
- Cloud type(s)
- % Cloud cover
- Comments. This is where we note bearings/distance off on traffic, landmarks or Aids To Navigation; when and what sail changes were made; times of turning engine, radar, autopilot, etc. on and off; and describe any boat problems, unusual incidents, or wildlife sightings that occurred.
- On arrival at the end of a trip a final line of entries was made and the engine hour meter reading noted in the Comment line. On the next line were calculated the time underway, log distance, average boat speed, and engine hours. Also, the rhumb line distance was calculated, and the speed made good towards the destination. Below these calculations a line was drawn across both pages, closing the log for that passage.

3. Trip Summaries

This section was kept on separate (stapled) sheets of paper, with a table that ran across one page. It had a column for each item listed below. A line was completed for every day (midnight to midnight) we were on a passage. This section was not filled out until each passage is completed.

Although it took a bit of effort to do this, the real payoff from keeping a log were found on this page since it is the part that was most often referred to. It provided the essential statistics about our travels and boat performance. We could quickly look here to find out where we were, when. And, in this summary, at each year's end, we made a note of of annual nautical miles travelled, hours underway, and days in transit.

- Day/Date
- Where the day started and where it ended
- Hours underway
- Engine hours
- Distance traveled through the water (boat speed or log)
- Distance made good over the ground (planned course) from chart or GPS

Where applicable (on a long passage) we also noted the following:

- Estimate of average (or else range) of True course for the day
- Estimate of average (or else range) of True wind direction for the day
- Estimate of average (or else range) of True wind speed for the day
- Estimate of average (or else range) of swell height for the day
- Estimate of average (or else range) of swell direction for the day

- Estimate of average (or else range) of swell period for the day

Chart Management

Managing a large and growing inventory of charts gets to be a problem on a sailboat with a limited amount of storage. Here's what we did while cruising on *Callipygia*.

We began our cruising career with a manageable collection of charts--the Chesapeake Bay to Maine and back. Then we needed charts to get to Florida. Then to the Bahamas. Then to the Caribbean as far as Trinidad. Then crossing the Atlantic. And, if we made it to Ireland, we'd need charts of the UK. We were reluctant to get rid of any, because--well, you just never know..... But, clearly, the number of charts we had on board grew with every mile we added to our cruising experience.

We started out solely with paper charts, and continued to have paper charts of our cruising area even although we were slowly moving to electronic charting. If we had good electronic charts, and good cruising guides, as technology and our experience grew, we no longer felt the need to have quite as many paper charts as before, but the rate of growth never shrank much. As we became more proficient at electronic charting, we felt we gained a slight safety edge – but only so long as electronic charts and GPS work. If we were to lose power, the satellite systems to fail, or equipment were to die, we thought it important to have paper charts to fall back on - not to mention the skills and tools to pilot properly, and to do celestial navigation. Also, we liked to have paper charts to plot our log positions on when we were on major passages. We found that planning a passage, and doing the navigation underway, were an interesting and fun task and gave the person on watch something to do if bored. Not to mention being on top of things in case of accidents.

There are essentially two ways to keep paper charts. Folding, or rolling. We started out as "folders" and kept our charts under the cabin seats, or (for chart kits) piled up on a shelf at the nav station. But after a while we got kind of overwhelmed because we had so many paper charts and couldn't quite keep track of which cushion they were under, and so we became "rollers"--except for the charts we were currently using (see below). Then, for long-term storage, we rolled our charts in Batches (of anywhere from 5 - 20 charts), with each Batch secured with 3 rubber bands. A batch contained all the charts for a particular area. A Batch Number was printed in red on a piece of paper with a list of the chart #s in the batch, and then wrapped around the end and secured with another rubber band. We put all the rolls together, wrapped them in plastic, and stored them vertically between the cabin table and the mast. (We wrapped them in plastic, because from time to time we had drops of water coming down the mast.)

We kept an inventory of all charts, and chart kits, in a spreadsheet, with the following columns:

- * Publisher
- * Chart #
- * Batch Number (see above)

- * Scale
- * Date
- * Name of chart
- * General area covered
- * Where stored
- * Misc comments

We printed out this spreadsheet, sorted by General Area covered, and put a cover sheet with an index on top that for each Batch listed:

- the Batch Number;
- where the batch was kept; and
- the name of the general area (such as "USA - east coast S of Norfolk") covered by the Batch.

We kept this inventory, pages stapled together, in a plastic sleeve with the other inventories in a wall pocket above the Nav Station. We found this made it easy to see at a glance where to look for a chart, or to find out if we had a particular chart.

While we were using a particular batch of charts, we reverted to being "Folders", since it was easier to work on charts that had been folded so as to fit on (1) the Nav Station, (2) the refrigerator top, or (3) the cabin table. Most were too big to fit on any of these areas, so we folded the Batch of charts we were currently using for convenience and kept them (folded) under the port-side cushions in the cabin until we were done with them, at which point we rolled them up again to store out of the way. We found Chart Kits, or (BA) Leisure Folios, extremely convenient. These are smaller charts either spirally bound together, or placed as a set inside a plastic cover (which is nice because you can plot on it with a china marker). We far preferred these (where available) to the very large government charts from which they are drawn. However, they're not universally available.

We kept our chart catalogues in a lexan wall pocket in the main cabin. When we ordered charts, we used a yellow highlighter to indicate which ones we'd ordered. That way, when we were planning a cruise, and we went to the chart catalog(s), we could see which ones we already had.

The Navigator's Notebook

This article describes how we planned our navigation details and used the Navigator's Notebook while we were cruising on *Callipygia*. We used a spiral notebook divided into two sections. At the front of the notebook, passage planning notes were made and passage directions developed. At the back of the notebook, navigation calculations and notes were made while underway.

We felt that it was really important to write everything down related to navigation while on passage, because it was too easy to make mistakes when we were tired - as we often were on an offshore passage. Near a coast, navigational errors are easy to make and can be deadly. The navigator's notebook worked well for us as a place to do our planning in a way that made for easy reference once we were underway.

1. Passage Planning

When planning a new passage, the following information went into the front of navigator's notebook, beginning on a new page. The date was put at the top along with the "from - to" for the passage being planned. Then, the information listed below was set out, in order. After the last element, a line was drawn across the page. While usually one person will likely do most of this work, all crew on a sailboat should be familiar with an upcoming passage's navigation issues and details.

The real benefit of doing this formal compilation of information came because in order to write up these details we had to pull out our cruising resources and become familiar with the guidance in them. On more than once occasion we found things that we needed to know for a passage, but would otherwise have overlooked.

- A list of the available charts that covered all or some of the passage area, and their area of coverage, their datum, year, and unit of soundings.
- A list of electronic charts that covered all or some of the area, and their areas of coverage.
- A list of Cruising Guides, Coast Pilot, Reeds Almanac, Light List, Admiralty or US Sailing Directions, etc. that covered all or some of the area, identifying the pages in each resource to be referred to. This exercise also ensured that we read the material and were familiar with the information we had on board about the area to be navigated.
- A list of hazards to be taken into consideration (currents, shoals, reefs, traffic separation schemes, whale migration routes, shipping routes, tidal/current deadlines to pass certain points by, etc.) in sequential order. Additionally, we made a note of danger bearings (compass bearing, or lat or long) so as to avoid shoals and reefs in the area to be transited.
- List of land features or Aids to Navigation to look for, in sequential order.
- Average tidal range, date of next full moon, magnetic variation.

- Weather notes (such as "crossing this area is reputed to be dangerous with a northerly swell") and an outline of the weather window requirements (length needed, acceptable winds and sea states).
- List of Waypoints: waypoint number and name; Lat/Lo; chart reference; cruising guide page reference; and course (magnetic) and distance between the waypoints. Note that we chose our waypoints so that all were in safe waters for bypassing hazards, and we never used a waypoint of any hazard itself. We also listed the Lat/Lo for important floating aids to navigation.
- List of ETAs, noting places to be passed by certain times to meet current, weather requirements, etc., and possible stopping places (anchorages, marinas) along the way. List gave estimated arrival/departure times, and described go/nogo issues. This list was made assuming 2-3 different SMGs (speeds made good) so it gave estimated trip schedules for Plan A, then Plan B, and if necessary Plan C. We avoided entering anchorages in the dark if we could, though we sometimes left an anchorage during the night to take advantage of night wind conditions.

As the navigator compiled this information, he/she also marked the route and waypoints on the relevant chart(s). He/she flagged the waypoints on the chart with small blue triangular flags cut from a roll of blue masking tape. The waypoint # was written on the flag so it was easy to refer back to the waypoint list. On the margin of the chart, for each quadrant or section of the chart, the navigator made a list of waypoints found on that quadrant, their GPS names, Lat/Lo, Cruising Guide page references, etc. Currents, commercial traffic routes, and other hazards were also described on the margin of the applicable chart quadrant and highlighted on the chart with a yellow marker.

The Navigator's Notebook was kept open and in the cockpit inside a plastic see-through sleeve while underway, so that it was easy for the person on watch to reference the waypoint list, hazard list, and passage directions, etc. as needed.

2. Passage Directions

For a complex passage, on the next fresh page in the Navigator's Notebook, a series of passage directions were set out. These could be referred to in the future if the same passage was again to be traversed. At the bottom of the passage directions, a line was again drawn across the page. Passage directions for travel from Luperón (Dominican Republic) to Boqueron (Puerto Rico) are given in the next article as an example of this format. These pages were available as needed by whoever was on watch to remind them of the navigation details and issues as we went along.

3. Navigation Calculations

The pages at the back of the notebook were used in conjunction with the Deck Log and charts when underway to document the boat's position as it progressed. Position and current calculations and/or diagrams of set and drift (done on graph paper, then cut out), etc, etc. were written or pasted in the back of the Navigator's Notebook. At the start of a passage, the date was written at the top of a fresh page in the back of this notebook. Then

as calculations, including celestial sight reductions if any, or diagrams were done, the author made and documented his or her calculation so that someone else could check them, if necessary--or he/she could go back and check for errors. After each calculation a short dashed line was drawn across the page. At the end of the passage a continuous line was drawn.

Passage Directions - Sample

I generally made written passage directions, because it forced me to read our navigation resources. Then we used the directions for reference while on watch once we were underway. We kept the Navigator's Notebook inside a plastic sleeve near the helmsman's seat. We kept it open at the passage directions page. This kept the Notebook dry and the directions immediately accessible. Many a time we were thankful we had done this, so that we didn't have to make up directions as we went. When the weather is bad, or someone is sick, it's not a good time for trying to think straight or do time or current calculations. I can't emphasize too much how fatigue can fuzzy a person's thinking. And, many sailors suffer from perpetual fatigue.

Below are the passage directions I wrote up prior to making a 2-night offshore passage against the trade winds from Luperón on the North Coast of the Dominican Republic to Boqueron on the east coast of Puerto Rico. (The reason this passage is a night one, is to take advantage of the "night lee" to dampen the trade winds we had to sail into.)

1. Use DMA chart 25730, then 25720, then 25700, then MapTech Chartkit Region 10, page 22. Use anchorage chartlets from Van Sant and Pavlides using page references as noted in the Passage Planning Notes in the Navigator's Notebook.
2. Waypoints in the GPS are marked on the charts with page references to Van Sant's and Pavlides' chartlets.
3. Generally speaking, don't use the "GoTo" feature on the GPS. These waypoints are for information only, except for Bruce's waypoint in the offing to get the anchor spot at Escondido.
4. The charts are old, so we'll navigate using bearings (compass and radar) and distance off (radar) on land features, and soundings, with GPS waypoints for support.
5. Plot fixes based on visual navigation. Plot the GPS fix at the same time and note differences.
6. The moon is full on _____. Tide is about 2' along the DR and 1' around PR. Magnetic variation is 10 deg 30 mins W along the north coast of the DR, and 12 deg W in the Mona Passage.
7. Along the DR, our strategy is to hug the coast at night (150' - 200' depth contour) to take advantage of the night lee. We'll watch the coast outline carefully on the radar. Expect there to be a bit of current going against us.
8. We'll leave Luperon at about 1800, and motor-sail to Escondido. We should pass Sosua around 11pm, and round Cabo Frances Viejo by 8am to arrive at Escondido by 5pm and rest at anchor for supper and a nap. We can stop at Rio San Juan if necessary. If we get to Escondido by noon or before, we'll consider skipping it and going straight through to Boqueron.
9. Watch for traffic and floating garbage, especially in and out of Puerto Plata. Keep well off.

10. After dinner and a rest at Escondido, we should depart between midnight and 0400 hours.
11. We'll check the weather forecast again at Escondido. If the weather window closes on us, then we'll either go to Samana, or else Punta Macao and wait. Otherwise we'll go on to Boqueron.
12. Pass Cabo Cabron close (200 yards) but give Cabo Samana a wide berth (at least ½ a mile.) Keep a close eye on soundings.
13. Once past Cabo Cabron and Cabo Samana (hopefully about 7am) head east or southeast, or even east-northeast for a bit, depending on the wind. Keep an eye on the Hourglass Waypoint, do not go south of it and watch soundings to be sure to keep well off the shoal. Stay outside the 1,000 foot depth contour. With luck we'll sail.
14. From north of the Hourglass shoal waypoint - which we should pass between 9pm and 11pm - head (depending on the wind) east then south. If we pass this waypoint before 8pm, we need to slow down some by tacking northeast for a bit, or reducing speed. Watch out for squalls in the coastal fronts rolling off Puerto Rico, keep them to the south until we are east of them - they should all be done by midnight.
15. Pass west of Isla Desecheo - hopefully between 2am and 5am - and then stay west of Tourmaline Reef.
16. After passing Tourmaline Reef, watch soundings carefully and head southeast to Pavlides' waypoint (#22, N1), entering through the north entrance to Boqueron. We should arrive in the morning, hopefully between dawn and noon according to how fast we sail.

Bump in the Atlantic

The October, 2003, issue of the SSCA newsletter had an article by Bob Cooley and his son Andrew. On the morning of July 13, 2003, they were aboard *Journey*, their 32' Westsail cutter, heading for a waypoint at 36° N, 050° W en route to the Azores. When they reached 35° 22.253' N, 051° 29.293' W, they spotted a dot on the horizon. They were near an area on the chart called "Corner Seamounts" but there was no mention of any summits on the charts. They went to investigate and found an overturned boat, at a charted depth of 865 meters.

Bob and Andrew saw wreckage beneath the unmarked boat and a large number of sharks. As they approached the upturned hull, their depth sounder showed that the bottom quickly shoaled from more than 600' to just 18'. When *Journey* approached these shallows, the weather was calm, and they were able to verify the position of the shallows and the wreck. They speculated that in storm conditions this shallow spot could easily cause a small area of very dangerous breaking seas, and a vessel caught in them could be rolled so that the mast impaled on the bottom.

Chapter 7 – Using Radar

When we started cruising on *Callipygia*, she lacked radar. We had it installed, almost as an afterthought, right before we left on our shakedown cruise to Maine. At that point we really thought you only needed radar if you were going to be encountering fog, and we realized that in Maine we probably were. And we did. But little did we realize how much wider would become the uses we would have for our radar. We were happy that we had bought the best system we could afford - and we can safely say that our radar system (and knowing how to use it properly) saved our bacon on more than one occasion. We ran into several cruisers who had radar, but had only the most minimal level of understanding of how to interpret its display. This included two who suffered serious collisions, and others who wouldn't leave harbor in the dark - even though it was the optimal time.

Radar has two basic uses underway: position fixing or confirmation which is called piloting,; and collision avoidance. You can with radar, for example, take the range and bearing to charted landmarks if they can be identified on the radar screen, and a range and bearing is a fix. The variable range marker (VRM) and electronic bearing line (EBL) make this very convenient. Collision avoidance can be used to avoid storms as well as ships or islands.

This Chapter is based on notes I compiled while studying the following resources:

- Starpath Radar Trainer [<http://www.starpath.com/catalog/software/1801.ht>];
- Instruction manual for our Raytheon radar system; and
- *Radar Afloat* by Tim Bartlett.

This Chapter has the following articles in it:

- Radar and GPS
- Tuning the Radar
- Basic Interpretation
- Collision Avoidance
- Relative Motion Diagram
- Storm Avoidance
- Radar Navigation
- Handy Radar Tricks
- Glossary
- Abbreviations

Radar Compared to GPS

Of all electronic navigation aids, I came to believe radar is the most important. GPS can provide a more specific position than radar can; however, in coastal navigation, radar does much better than a GPS to tell if you're in the middle of a narrow channel - where you do not need to know your precise coordinates. It will pick out other boats, as well as markers that may be new, or have moved from their placement on charts. Out in the ocean, the GPS tells a precise position – but that is not really needed. The real value of GPS is (1) its ability to tell accurate course over ground and speed over ground and (2) for transmitting a boat's position coordinates in case of emergency.

What the radar can do that the GPS cannot is warn of collision risk with fixed or moving targets. With good land mass targets, often available in dangerous situations, one can find from the radar everything that GPS tells one - only more slowly and less accurately. Both tools are important and every captain should have and know how to use each of these navigation aids. The two, together with a depth sounder and a good knowledge of navigation principles, are the main arsenal for safe navigation.

GPS, especially interfaced to an electronic chart plotter, is the quickest, easiest, and most accurate way to track a boat's position. A key point, however, is that we need some means to confirm the GPS position relative to other objects. Radar is most often the best way to do that.

An experience: On returning to the Chesapeake Bay (retracing our outward route) from our shakedown cruise to Maine in 2001, we ended up slogging our way down the New Jersey coast much slower than we expected. It wasn't until 1430 hours that we turned into Delaware Bay, later than we expected. We motor-sailed up the bay just outside the channel to avoid the busy traffic. There were no safe anchorages/harbors anywhere nearby. We consulted Reed's Nautical Almanac and the Coast Pilot to confirm that the Chesapeake and Delaware Canal was lighted. We decided to go through the canal in the dark, hoping to stop at Schaeffer's Marina towards the Chesapeake Bay end of the Canal. We arrived at Reedy Point near midnight, and found very very confusing lights. Immensely thankful for our trusty radar, we were able to pick up the entrance to the Canal on the screen. We picked our way into the Canal mouth, and using radar along with canal lights safely made our way to Schaeffer's, where we gratefully docked alongside at 0313 hours. (See the Ship's Log for more.)

Tuning the Radar

Read the system manual, also read other system manuals for additional insight. Note that Standby reduces power consumption by typically, about ½ or more. It also extends life of the radar unit. Points to bear in mind:

- It is always easier to tune with targets on the screen than with none in range. Practice with this where there is traffic to prepare for when there isn't. Watch for a case with traffic safely passing in a rain or snow squall to practice with, and see the effects of rain, snow, and sea clutter.
- Do not "over tune." Some controls work against each other. As a general rule, keep all optional controls in the off or minimum settings. Set Gain to have a light background of speckles when set to the high ranges. Then use the other controls only as needed. With no targets and significant waves present, to look for close targets, first zero the rain and sea clutter, set range to high value, increase gain till a light speckled background, reduce to lower range, and then increase rain and sea clutter to break it up into speckled pattern of dots.
- For optimum resolution (i.e. to distinguish two close vessels, or identify a landmark) , use the lowest range scale that shows the target, and lower the gain to prevent distorting the display.
- When looking for targets at your maximum range, turn up the gain temporarily to a more continuous pattern of speckles. and watch the screen intently. When new targets first come into view, they may show only on every other sweep or maybe every tenth sweep.
- The size of the blip on the screen is not a measure of the size of the target - unless the object is big and close.

Basic Interpretation and Use of Radar

Points to remember when using radar:

- The microwave emissions from radar are a potential risk to health. Do not expose crew or nearby boaters to waves from your radar. Therefore, turn off the radar if someone goes forward on the deck or you are close by other boats.
- If one person adjusts the radar, be sure to communicate that information to other crew and/or watches.
- Generally use Heads Up mode. However, for piloting it may be handy to do North Up so you can match what you see on the radar screen with what you see on the chart. Practice the two modes.
- If a target moves down the screen at your speed, then it is a buoy, or else something anchored or dead in the water.
- If a blip does not move at all on the radar screen, it is doing precisely what you are – it's on the same course at the same speed.
- If a target moves only to the left or right, and not up or down on the screen, then its speed is identical to yours, but its course is pointing higher or lower.
- If something moves straight up or down the screen, then it is pointing exactly the same direction as you but is going faster or slower respectively.
- If something moves diagonally from you, then both its course and speed are different from yours.

Collision Avoidance

This is the premiere function of radar, telling what traffic is out there and what it is doing. But this is not a simple matter of just looking at the radar screen. The analysis involves first and foremost determining whether or not the target poses a risk of collision. Next is determining what the circumstance is that leads to this risk. For targets closing in on a diagonal track, as opposed to coming from dead ahead, the analysis is a bit more involved. Develop standard simple plotting procedures that will let you know as quickly as possible what is taking place. (See article on Radar Plotting) Also, review the pertinent Navigation Rules and be familiar with them.

In order to comfortably use the radar in a potential collision situation, you must have practiced with EBLs, VRMs, DRMs, SRMs and CPAs ahead of time. Otherwise, the stress involved in a real life predicament may freeze your brain.

Points to remember:

- A main challenge underway is dealing with the tracks of targets on unstabilized radar. In typical small craft radar (ie unstabilized), the plot trails of radar targets are smeared out due to the yaw of the vessel in a seaway. As the heading of your vessel swings around in this seaway, the apparent location of a radar target moves with it. If you were on a heading of 200, for example, and you observed a target at 7.0 miles off bearing 40° on the starboard bow (its true bearing being 240), when the radar beam hit that target and plotted it on the radar screen it would show it on the radar screen at 7.0 miles off at 040 relative. Then if a wave sent you onto a heading of 204 for a moment, and the radar beam happened to hit that target at that moment, it would see and mark the target at 7.0 miles off at 034° relative -- even though the actual true bearing to the target is still 240. The wave caused a rotation in the radar's reference line. Furthermore, if your heading slowly swung back and forth between these two limits as the radar marked the target positions, it would plot the single target as a smear between 034 and 040. At 7.0 miles off, this angular spread corresponds to an arc length or target width of about 0.7 miles. Note that the arc length is about 0.1 x time range per each 6° of angular width. As the target got closer in this same average seaway, then at 2 miles off, the effect of an average 6° heading swing would lead to a 0.2 mile spread in target width.
- The Plot (wake, track) option is very useful and should be practiced with so you can track the progress of moving targets.
- Use a portable range scale (tongue depressor) or a ruler to estimate distance. Remember that rings are the same distance apart even if you change the range.
- Read your manual to find out all of what is available on your equipment and practice, practice, practice.
- When you first see a target, set the EBL and the VRM. Put an X on the screen with a china marker or dry-erase marker, and beside it write the time. After 6

minutes, put another X on the screen with the time. If it moves inside the VRM it is getting closer. If it proceeds along the EBL you are on a collision course. Remember the 6-minute rule. When the time = exactly 6 minutes, Distance = Speed/10 or Speed = 10 x Distance. Therefore, set the plot to 6 minutes, then time in minutes between plots times 10 = knots of SRM (speed of relative motion). Note that in a seaway, the trails are often smeared out which makes a precise estimate more difficult.

- To get DRM (direction of relative motion), put EBL parallel to the target's plot. Use a rule through the track and figure out the CPA (closest point of approach). This is the perpendicular distance from the DRM to the center of the screen (you).
- Figure the time until the CPA by measuring how far from the target to the CPA, and dividing by its SRM.
- Figure out SRM for each target. If it is moving downscreen towards you at your speed, then it is dead in the water or a bouy. Otherwise it is a moving target.
- If it is moving downscreen at an SRM that is greater than yours, it is headed towards you at a speed equal to SRM minus your speed.
- If it is moving downscreen at an SRM less than yours, then you are overtaking it, and its speed is your speed minus SRM.
- If you slow down, the radar track for the target curves up the screen.
- **Aspect** is the angular perspective at which we see a vessel – i.e. the relative bearing of a vessel as seen from another vessel. It is measured from 0° to 180° and labeled red when we are on the port side of the vessel or green when we are on the starboard side. To say we see a vessel with an aspect of 90° red, means he sees us on his port beam and we are looking square at his port side. We see his red running light and his mast head range lights are as open (separated) as possible. An aspect of 45° green, means he sees us broad on his starboard bow. He is headed 45° to the right of our line of sight to him. We would see his green starboard running light. A vessel with aspect 0° is headed straight toward us.
- Note that the big difference between visual observations and radar observations is the perception of a vessel's aspect. When a vessel turns we can usually detect a rotation of the hull or lights much more quickly by eye than we can on the radar.
- A radar observation in itself tells nothing of the aspect. This is why it is always important when a target is first detected on the radar to immediately go on deck with binoculars and start looking to see if you can discern its direction – towards us or away from us. Sometimes a glance at the radar might lead us to think we should be looking for a red aspect. Is it pointed to the right or left of us? The solution to the RMD (relative motion diagram) reminds us that the true aspect of a target headed towards us is always higher than it appears from the DRM. If we think we should be looking broad onto their bow from what we see in the radar, we are actually looking more toward their beam. The amount higher depends on how fast we are moving and on their relative bearing. True aspect is always aft of

apparent. If aspect increases as the vessel approaches us, it will pass ahead of us. If it decreases, we will cross in front of it.

- For many practical applications, a quick plot on the radar screen will provide adequate information for safe efficient operation - at least as far as the basic collision avoidance operation is concerned, which is a solution of the RMD to find the course, speed, and aspect of the radar traffic. The more complex operations, such as choosing the change of course to make a specific CPA or related problems, are usually better done as transfer plotting on the maneuvering board. [Hint: We laminated a Maneuvering Board sheet, so we could draw on it with a china marker or dry-erase marker. Worked great.]

Two aspects of the Navigation Rules are very important here:

- Any action taken to avoid collision must be **obvious** and made **early**.
- It is often not possible to tell which side a target will pass if it seems to be coming straight at you - it's directly ahead, or on a constant bearing. Therefore it is best not to alter course until that information is available to you. To gain time, reduce speed or just stop until you can see what's happening. If you alter course too early in this situation, you may actually bring yourself closer to the target.

Relative Motion Diagram

When targets are moving straight up or down the screen, you don't need to do this diagram. Simply add or subtract your speed to theirs to get SRM. However, it's a good idea to get in the habit of doing an RMD for other cases. Practice it until it comes easily to you.

Radar maneuvering problems can be solved by one of two methods: traditional graphic methods using plotting sheets (or rapid radar plotting with a china marker right on the radar screen) or they can also be solved directly with mathematical formulas solved with a calculator or computer. The latter method, if practiced, can (we are told) be quicker and more accurate. See *Dutton's Navigation and Piloting* for the formulae.

On *Callipygia* we mostly used the radar screen to plot the Relative Motion Diagram. You can also use a plotting sheet or Maneuvering Board, or even graph paper. Mark two positions of the target with their times (6 minutes apart), along their DRM as they appear on the radar. The Direction of Relative Motion is the line of the target's track--if you do an EBL parallel to the track, you will get the DRM. From the first target position, draw a vertical line down a distance equivalent to the speed your boat has moved between the two readings. Draw a line from this point to the second position of the target. The direction of this line is the target's true course (relative to your course). The length of this line is the true speed of the target. It's not hard, and it's not always obvious but it's really important so you know who should stand on and who should give way. It will tell you if you are overtaking, being overtaken, or if you're approaching head on or crossing it will tell you what the relationships are. You should record this information in the log.

Storm Avoidance

The first order guess of the right course would be that course which is perpendicular to the course of the approaching storm target. This will certainly increase your CPA over doing nothing, but this is not optimum. The optimum course is forward of that perpendicular course by an amount alpha (!) which depends on your relative speeds. In the perpendicular course you are just "sliding off" as the storm approaches. In the optimum course, you run and slide. You don't move off its track as fast, but you get longer to progress away from its impact and end up with a bigger CPA. The amount to add to the relative perpendicular course is

$$\alpha = \arcsin (u / v) \text{ where } u = \text{your speed and } v = \text{target speed.}$$

Remember, α gives you the angle forward of the perpendicular to the storm's true relative course, not forward of your first bearing to it.

Some rules of thumb for getting an α when you don't have a calculator or can't use the formula:

- If your speed is the same (or more than) that of the storm, then alpha approaches 90 degrees and you run ahead of it.
- But if the storm is moving at all faster than you, then α gets smaller until when the storm is going twice as fast as you, then α is about 30.
- If the storm is going 3 times as fast as you, then α is about 20.
- If the storm is going 4 times as fast as you, then α is about 15, or five times then α is about 10.
- When you choose the optimum course, the CPA occurs when the storm center crosses your stern. If you just take the perpendicular course, the CPA occurs before it crosses your stern. If a storm is headed straight toward you, you could go either right or left of its path. In this case, however, there would be a preferred side to take -- you would go toward the so-called "navigable" side of the storm (left in the northern hemisphere) as opposed to the "dangerous" side (right in the NH).
- The philosophy here is to turn away from the storm center and get it behind you, then keep turning until the DRM = 90°. That will maximize the CPA so that it will occur when the storm center crosses your stern.

Radar Navigation

As a rule, your GPS will be the primary means of exact position location, but it will get you into trouble if you use it as the sole means of navigation, especially at night. In those circumstances the direct view of your position relative to land masses seen visually on the radar will be the preferred means of navigation. This is particularly the case in confined waters when there might not be time nor need to continually transfer GPS positions on to a chart. Various electronic plotting aids may be an option in these cases, but the radar is usually a more dependable solution. Even in cases where GPS and electronic or paper chart plotting are the main means in use, radar observations for confirmation are the hallmark of good navigation.

A normal position assessment might proceed by plotting the GPS position on the chart and then, from that position on the chart, note the range and bearing to some charted landmark that is likely to be a prominent radar target. Then go to the radar to check if that is true. At the same time, when in soundings, one should check that the depth is what it should be as well. On most electronic chart displays, the range and bearing to a landmark can be made with the mouse cursor in a matter of seconds. Without such things, we must plot the position on a chart using parallel rulers and dividers. This is a valuable way to use radar for position navigation whenever possible. It not only confirms your position, but also helps you identify radar targets (land masses) on the screen. Without this ongoing practice, it may be difficult to identify a headland or bay or islet, etc., when you do need it. It also builds simple confidence in your work. If you rely solely on the GPS you will be anxious about your work and you have a right to be. In coastal navigation, the process of going back and forth from radar to chart has the advantage of keeping you informed of the name of the headland or bay you are nearest—extremely useful in communicating with other vessels or the Coast Guard if you have an emergency.

There are two separate aspects of chart navigation with radar. One is the use of radar to locate or confirm an actual position on the chart. The other is to use radar to guide you along a desired course without necessarily deriving the actual coordinates of your position along that course. You can, for example, use radar to maintain a specific distance off of a shoreline without caring so much exactly where you are along that shoreline.

In general, the key to chart navigation with radar is to coordinate it with other piloting aids, especially with GPS and depth sounder. With chart at hand, the most common procedure is to locate the GPS position on the chart, and from there figure the range and bearing to what you suspect might be a good radar target, and then look to the radar to confirm this observation.

If the distinction between the green and blue or white on your chart is not prominent, then it will pay to use a highlighter to outline the shoaling areas (blue) or foreshore (green). This forces you to go over each region you might pass through carefully and then the marking makes it stand out as a warning. Sometimes in the faint light of a wheel house or nav station it is difficult to see these crucial distinctions without this added highlighting.

Identification of specific landmarks from their radar image can be a challenge, hence the terminology of "a good radar target" versus something else. A good landmark target is one that is easily identified on the radar screen -- usually tall or steep along all its borders, with a unique shape, or a small but reasonably tall isolated islet. A drilling platform, for example, is a very good radar target. A RACON is an ideal radar target. A low spit of land can be a very poor radar target. How well a landmark shows up on the radar depends on its range and bearing, but a so called good target would be less sensitive to this. The key issue is the height of the land and the resolution of the radar. Resolution is how well two nearby objects are resolved (separated) on the radar screen.

Radar range is slightly farther than visual or geographic range due to refraction of microwaves. Maximum range = $1.2 \times [\text{sq. rt (ht of your radar)} + \text{sq rt (ht of target)}]$. If your antenna is 9 feet high and you are looking for a ship that is 81 feet high, then it will first faintly appear at about $(3 + 9) \times 1.2 =$ about 14 miles. Hence even if you have a 24- or 36-mile radar, then you have to be looking for something higher than 81 feet or you won't see it from an antenna that is only 9 feet high. (The max. range scale specified on radar units has more to do with their power output, than how far you will see targets. If the target is beyond the "radar horizon" given above, you won't see it, no matter how much power you are broadcasting.) If you install the antenna much higher, say from a spreader at 16 feet, then you only gain 1 mile, and if you go on up to 25 feet, you still only gain another mile. On a small boat at sea, an antenna that is 25 feet high will be rocking so much with the waves that some of this elevation is wasted. Most small craft find that an antenna height of 9 to 12 feet (on a post in the quarter) is perfectly adequate and avoids extra weight aloft from the long heavy cable.

Radar resolution has two separate factors: bearing resolution and range resolution. The typical horizontal width of a small-craft radar beam is about 6° . This means that any two objects separated by less than 6° will be smeared together (unresolved) into a single target. The same pulse will hit both of them. As it turns out, the tangent of 6° is $1/10$, so if two adjacent objects located a distance D away are to be resolved into separate targets on the radar screen they must be separated by a distance of at least $D/10$ from each other. Two vessels, for example, seen 3 miles off, must be 0.3 miles apart or they will appear as one. If the entrance to a bay is 0.4 miles across, we would not expect to see it as an opening (when headed straight toward it), until we were within some 4 miles of the entrance. It is a good idea to practice these things and make your own measurements with chart in hand to see how this works.

Range resolution is determined by the pulse length of the radar signal. A microwave travels at the speed of light, which is 186,000 miles per second. This can be converted to a speed of 328 yards per microsecond. If two objects in line (same bearing) are separated by less than one half a pulse length, then the nearest target would still be reflecting signals from the end of the pulse when the farther one starts to reflect signals from the front of the pulse. Therefore they would appear as one object. To be resolved, two objects at the same bearing must be separated by more than 164 yards per microsecond of pulse length.

Typical pulse lengths vary from 0.1 to 1 microsecond, and the one in use depends on the range. In some few units you can select pulse length, in most small craft units this is done automatically for you when you change ranges. In one unit, for example, on range 3

miles the pulse length is 0.3 microsec and on range 4 miles it is 0.8 microsec. Note that in this case, you could have two close vessels (tug and tow) that were separated by 100 yards at 2.8 miles off. On the 4 mile scale they would appear as one vessel (resolution 131 yards), but on the 3-mile scale they would show as two distinct close vessels (resolution 49 yards). Again, something to practice with using your own radar. You have to look up the pulse lengths used for the various range scales in the specifications section of your manual.

The following situations summarize the use of radar for navigation:

1. Range and Bearing fix with radar

This is the work horse for piloting - at least so far as confirming the GPS position is concerned. The extreme and frequent value of this operation cannot be judged by how easy and short it is to explain it.

- Identify a landmark on the radar that you can identify on the chart. For optimum fix, this should be a well-defined radar target, whose bearing can be taken to an obvious center.
- Set EBL and VRM on this point and read off their values. Note the time and your heading.
- Convert the EBL bearing to a true bearing using your heading. If the landmark is at 128 R, for example, and you are on course 215 magnetic, then the EBL bearing is $215 + 128 = 343$ magnetic.
- Then plot your line of position on the chart exactly as you would if you had taken a compass bearing to the landmark of 343 magnetic. That is, using the magnetic compass rose on the chart, draw a line emanating from the landmark in the direction of $343 - 180 = 163$ magnetic.
- Your distance from the landmark is what you read on the VRM. Measure this off from the landmark on the chart and you have your position.

Notes: The key issues here are obvious: be sure you have the right landmark and carefully judge how to draw the bearing line and range circle on the chart relative to that landmark. Small, distinct, isolated targets are best for this method. If just using the method to confirm the GPS position, on the other hand, you have more flexibility in targets, but still, whenever in doubt, do range and bearing to several bodies.

If you have to use a tangent to a steep cliff or rock, be sure to correct it for half the horizontal beam width as explained in Lesson 6.4 -- if HBW is 6° , then subtract 3° from right side tangents and add 3° to left side tangents, since you are seeing the targets smeared out by that amount. You have to judge with experience if a tangent is better than an estimate to a center for extended objects. Do not rely on buoy sightings for your own position location. Buoys may not be in the right spot, or you may be looking at an anchored vessel and not a buoy at all. The exceptions are RACON buoys which are about the best possible radar targets. Practice is the key factor for good work in this area.

A key role of radar is more often to check the GPS position than it is to actually establish your position from scratch. In this process, you plot your GPS position on the

chart, then use parallel rulers and dividers to check the range and bearing to what might be good radar targets in range. Then look at the radar to confirm these observations. If in soundings, compare the depth as well.

2. Radar Fixes from Two or More Bearings.

These offer a quick method of radar piloting that is familiar to all navigators since it is directly analogous to compass bearing fixes. Unlike visual bearings, however, radar bearings taken from typical small craft radar are generally not as accurate as can be done carefully by eye using a high quality bearing compass. The problem is twofold, one the radar bearing must be corrected for the heading of the vessel when using Heads-up display, and in any display mode, the angular width of the radar beam tends to smear out the target size on the radar. Consequently, piloting with radar bearings is best done with small well defined targets whose center can be identified on the radar and on the chart.

If tangents must be used, then the measured bearing should be adjusted by one half of the horizontal beam (HBW) width for your radar. These vary from some 8 ° to about 2 °, meaning corrections of 1 to 4 °. HBW depends directly on the size of the antenna -- larger antennas have narrower beams -- and the precise values are listed with the radar specs. For tangent bearings to the right of an object, subtract one half of HBW and for tangents on the left of an object, add one half of the HBW.

1. Identify two or more good radar bearing landmarks on the radar that you can identify on the chart.
2. Set EBL on these points and read off their values. Note the time and your heading.
3. Convert the EBL bearings to a true bearings using your heading. If the landmark is at 128 R, for example, and you are on course 215 magnetic, then the EBL bearing is $215 + 128 = 343$ magnetic.
4. If the bearing is of a tangent, then correct for one half of HBW as explained above.
5. Then plot your lines of position on the chart exactly as you would if you had taken compass bearings to the landmarks. That is, using the compass rose on the chart, draw a line emanating from the landmarks in that direction.
6. Where the lines of position cross on the chart is your position fix. Three bearings are much better than just two, since the size of the "cocked hat" intersection of the LOPs is some indication of the reliability of the fix.

3. Two Bearings and a Range.

These can provide a good fix -- it's a standard procedure in routine piloting using a hand bearing compass. Two close bearings, however, such as two sides of a small island, are generally not a very good fix even using visual bearings. With radar, on the other hand, we can occasionally get a reliable fix from two tangents of some object by combining it with a range measurement to the object. This is effectively a way to do a Range and Bearing fix to an object that is too large to locate with a single bearing line.

1. Identify a prominent landmark on the radar, such as a small island, that you can locate on the chart.
2. Set EBL on the left and right tangents to the landmark, and read off their values. Note the time and your heading. At the same time, read and record the VRM range to the portion of the same landmark which is closest to you.
3. Convert the EBL bearings to true bearings using your heading. Then correct each bearing for one half of the Horizontal Beam Width (HBW) as explained in Pub 1310. In practice you will use the value given in the specifications of your own radar unit. For plotting exercises in Radar Trainer assume an HBW of 4° , which means you will add 2° to left-hand tangent and subtract 2° from the right-hand tangent.
4. Then plot your lines of position on the chart exactly as you would if you had taken compass bearings to the landmarks. That is, using the compass rose on the chart, draw a line emanating from the landmarks in that direction.
5. Using a drafting compass or beam compass plot the VRM range from the landmark.
6. Your position fix is halfway between the two bearings, on the range circle plotted from the VRM.

4. Fix by Two or More Ranges.

To take the best advantage of radar for chart navigation, you need some form of drafting compass for drawing circles. Most dividers have an optional lead to replace a point, but for doing much of this a dedicated drafting compass would be useful. An alternative is just to tie or rubber-band a pencil onto your dividers and use that. Or just use the dividers and mark positions along the arc with a pencil. This method relies on ranges alone (without bearings) which can in principle offer a more accurate fix than the quicker range and bearing to a single object. Also when using 3 or more targets (for ranges or bearings) you get a "cocked hat" of intersections which is some measure of the reliability of the fix. If the intersections are too large, then take a 4th target to help identify the bad one.

The disadvantage of any method using more than one target, however, is that your own motion -- if any -- must be taken into account for an accurate fix. In other words, all multi-body fixes are to some extent running fixes. Remember that objects ahead or astern change range more rapidly than objects abeam, so it is generally better to measure the ranges on the beam before those on the bow or stern. If you want to carry out a proper running fix, then the general procedure is to advance the point of reference and then draw the range circle.

- Identify two or more landmarks on the radar that you can locate on the chart. Confirm that these are good radar range targets, meaning sharp steep edges as opposed to low, gently rising edges. (Later you will confirm that the edges you are seeing on the chart are indeed above the horizon and what you are looking at on the radar).

- Set VRM and EBL on the chosen targets nearest the beam. Read and record the values. Then do the same with the second or third targets.
- Use the bearing lines measured to identify the point on the landmark whose range was measured. From that point, use a drafting compass or beam-compass, to draw in the range curve through your approximate position. Do the same with the second observation.
- Where the lines of position cross on the chart is your position fix. Again, three ranges are better than two, and these will be best when they are some 120 ° apart.

5. VRM as Piloting Aid.

There are many creative ways to use the VRM circle for navigation. Here are a few suggestions. Others will undoubtedly occur to you to meet specific navigation problems.

1. Sailing parallel to a coastline within radar range, you can set the VRM circle to just touch the coastline. Then as you proceed along the coast, just a quick look at radar screen tells if you are getting set in toward or away from the coast, or if you have wandered off course for any reason.
2. Approaching a headland or rocks in view on the radar, you can decide how close you dare get in based on the chart, then add some safety factor, and set the VRM to that distance. Then as you approach, you can tell without further reckoning when you are at the minimum distance off.
3. Some combination of (1) and (2) can often be useful such as crossing a large bay or entrance. Set the VRM to the distance off that you were following the coast up to the entrance and then leave it set as the coast falls away into the opening. The VRM will now not be touching any land, but you can see the lay of the coastline lower on the screen. Use a parallel line (parallel to ship's heading line) to project the tangent to the VRM backwards to see if your circle is penetrating into the entrance or slipping away from it - i.e., getting set into it or out of it.
4. You can navigate to a particular point on the chart in an easy manner if it happens to be equal distant from two distinct radar targets separated by at least half the distance off you care to achieve. Set the VRM to the particular distance, then drive in and adjust course as needed until both targets touch the VRM circle. This will put you at a unique place on the chart.

Handy Tricks with Radar

Again, as with the VRM methods, there are numerous uses of the EBL line for navigation, and other general techniques that can help with navigation in some form. A few useful ones are listed here.

- Radar and natural ranges. As with visual navigation, any use of a natural range for monitoring course is especially valuable. When sailing toward or away from any two stationary radar targets in range, you have a quick and accurate means of determining if you are being set off course.
- Locating a channel entrance. Occasionally on approaching a coast there can be numerous small targets near the entrance.
- When looking for a buoy channel, read from the chart what the buoy spacing is along with the compass bearing of the channel. Then you can identify the buoys from the radar by measuring the spacing and confirming the bearing. Mark the candidates on the screen, and use a portable range scale to check separation. Then set EBL parallel to the lay of these targets and confirm its bearing.
- Choosing an anchorage site. In some circumstances, radar is useful for choosing a place to anchor within a crowded anchorage and then later used to confirm or check for anchor drag. Also, invaluable if you have to anchor in the dark.
- Plot trails from stationary targets. In some circumstances, with a prominent landmark or well identified buoy on the radar screen, you can use the length of its plot trail as a measure of your distance run for solving the relative motion diagram and thus save or confirm this simple computation.
- Squalls. You can use radar and the relative motion diagram to analyze squall motions. Once you confirm the motion of one or two, you can guess that subsequent ones during the night will move in the same way. Most squalls in the Northern Hemisphere, tend to move in a direction that is veered from that of the surface wind direction by about 20° or so, at typical speeds of about 15 knots.
- Landmark identification. Don't forget that you can measure the dimensions of landmarks with the radar. This will often help identify it, i.e. if this is that islet, it should be 0.43 miles across. Is it? Or if that indentation is the entrance, it should be 1.2 miles wide, etc. Set the optimum range and then use a portable range scale to check it. The very latest models of radar include a "Floating EBL" option that lets you make these measurements directly from the screen.
- Radar and atmospheric visibility. Radar is very often the best way to determine atmospheric visibility which is in turn needed to anticipate first views of land or vessel traffic. At twilight, measured values of the visibility can then be used to predict the visible range of lights that you will use later in the evening and night.

Glossary

This lingo of radar can be quite confusing. Figure out how these apply on your own system.

Gain is the amount of signal. This is the major control used in radar tuning and must usually be adjusted when making large changes in the range. Normal settings of this are done with the rain and sea clutter full off and on a high or maximum range scale. Then increase the Gain until you see a faint coverage of white specks on the background over the full radar screen. Note that full gain can turn the screen white and zero gain turn it black. Most operators prefer just a faint coverage of white specs in the background. If the Gain is too high, you will lose resolution and if too low you will miss targets. You must also experiment with the Brilliance control as it affects Gain. Gain must usually be reduced when large close targets are present or it will smear across the entire screen and block out all other targets. Gain may have to be increased when looking for small targets or when using rain clutter. Sometimes better range and bearing resolution can be achieved by reducing the gain and sometimes reducing the gain will help reduce clutter from rain or snow. Remember to always replace the gain to its normal settings if it has been changed for some reasons.

Sea clutter. This is a control that should be kept at minimum or off unless needed. If set too high, it can block out close targets. Generally it does nothing for ranges farther than about 4 miles or so. In calm sea conditions, this should be kept off. In rough seas, the entire close in region of the screen on the lower ranges will be nearly solid white from wave reflections. In these cases, this control should be increased until this smear is broken up into a pattern of small dots. This is easy to optimize if you have close small targets present. Just increase the sea clutter till they stand out prominently. Without such targets, you have to just estimate this. It is important to not run this filter too high or you will lose small or even medium sized close targets. Always leave some clutter showing. If you are heeled over, or for any reason there is more clutter to windward compared to leeward, you can be reasonably confident that the sea clutter is right by turning it up till you see this distinction clearly on the radar screen, but still leaving some clutter on the weaker side.

Rain clutter (FTC). When in or near a rain or snow squall, the radar screen becomes cluttered with reflections from the precipitation itself. This can be so severe that it can mask the presence of any target in a nearby squall--or if you are in the squall, mask the presence of traffic approaching even though they are not in the squall. Reflections from precipitation are usually easy to identify from their "wool like" appearance. A rain squall on the radar screen looks rather like a cloud drawn raggedly with charcoal. Often the exact boundaries of a squall, or at least the part with rain content, can be clearly seen on the radar and even maneuvered around if necessary. The rain clutter filter breaks up the continuous display of precipitation echoes into a speckled pattern. These filters generally work quite well in rain and snow and will reveal targets which might not otherwise be seen. In heavy snow or hail the radar may be effectively blocked out by this interference and these controls may not adequately solve the problem. Once the precipitation goes away, the filter should be shut off. Note that this control might also be used in fair weather in crowded or confined harbors that present much radar clutter, or regions with bright

land areas, to sharpen the picture since it does reduce the sensitivity in a manner that is qualitatively different from reducing the gain. Note that unlike the Sea Clutter control that works close in and progressively less at larger ranges, the Rain Clutter control works uniformly over the full range of the display.

Echo stretch. This is a radar option that enhances the sizes of targets. It can be useful when looking for or following a small target. Turn it on, and all targets get larger. It lengthens then along the arc about the center of the screen. This option should normally be run in the off mode.

Interference rejection. Your radar unit will pick up noise from other vessels' radars which will appear as either a background of dots or dotted arcs that shoot across the screen. This can present problems in crowded harbors. Turning on this function will eliminate the interference background. The shooting dotted arcs are easily identified. They are transient and usually do not appear in the same place twice. This option can be left in the on mode with no deterioration of performance. It should be tried periodically in congested waters to see the effect and if it helps. As an aside, if you detect these while at sea, it is a sign of the presence somewhere of another vessel with its radar on, even though you do not see it on the screen or visually. The source of this interference can be well over your visible horizon and may not appear at all.

Zoom and offset (shift.) These functions appear on some modern radars, although their function and operation may differ with the models. Offset or shift relocates the center of the display away from your own position so you can concentrate on a specific region. Generally you set a cursor to the new center and press a button to shift to it. Zoom allows users to expand the range about the new center, also sometimes using the cursor position to determine the extent of the zoom. These can be very useful options for watching specific circumstances, but they do leave the radar set in an unusual display. This could lead to confusion in some cases, so it is important to convey to all in use of the radar about how it is set and to return it to normal when done with that observation.

Guard sectors and alarms, and watch mode. This allows you to define a safety range ring using the VRM, and then set an alarm that will sound whenever a target is detected within that ring. Some equipment allows for two rings to define more complex alarms, or even allow for using the EBL to convert the rings into sectors. Test such arrangements extensively before relying on them. Read the manual carefully on their use, as the gain and other options must be set properly. Some radars also offer a power saving option that allows you to program the radar to remain in stand-by mode but still automatically come on every 5 or 10 minutes to make a few radar sweeps to look for traffic. This option combined with guard rings and alarms might offer some level of warning for short handed operations. Needless to say, however, a proper watch is not kept by such arrangements. There is no electronic device that can be relied upon completely to detect and warn you of approaching traffic with risk of collision. Serious collisions have occurred involving vessels depending on such a system.

Tuning is synchronization of sent and received pulses. To use manual tuning, the best procedure is to tune on an isolated clean target a mile or two off and adjust until the image is sharp, with Gain set about 50% full range and Sea clutter and Rain clutter turned

off. Your manual will be the best guide to this. Watch the tuning bar as well if one is there. If the sharpest image does not correlate with the fullest tuning bar, then again see a technician.

Abbreviations

Using radar involves a veritable alphabet soup of abbreviations. Here are the ones you need to know:

- DRM - Direction of Relative Motion
- SRM - Speed of Relative Motion
- RMD - Relative Motion Diagram
- VRM - Variable Range Marker
- EBL - Electronic Bearing Line
- SHL - Ship's Heading Line
- CPA - Closest Point of Approach
- TCPA - Time to CPA
- MCPA - Minutes to CPA
- BCPA - Bearing to CPA

Chapter 8 – Weather

More than any other factor, weather conditions affect the comfort and safety of a boat and its crew on a passage. Things can go wrong with the crew, or with the boat, but if the weather is bad when that happens safety is much more likely to be compromised. And, if the crew picks a route that goes against the grain of the prevailing, or periodically typical, weather they will have a slow and uncomfortable time with the need to rely frequently on the engine.

Fair winds minimize the need for the engine and hence maximize time under sail. Swell height and direction, and the wind waves on top of the swell, affect comfort far more than wind speed. Land topography and shoals affect both wind and seas - not only on a passage, but at anchor. Only after the weather conditions necessary for a safe and enjoyable passage are understood is it possible to begin looking for a weather window in upcoming forecasts.

While we were cruising, we spent countless hours trying to understand and predict weather. We learned that there is no quick way to get a grip on this complex subject. There is no substitute for study combined with observation--and on a sailboat this can take several hours each day. In addition, a mastery of marine radio is essential.

This Chapter is based on notes I compiled while using the Starpath Weather Trainer [<http://www.starpath.com/catalog/courses/1804bc.htm>], studying various texts on the topic, attending weather courses and seminars, and from observation and experience.

The first four articles describe the process I used to track weather using a Weather Notebook. The remaining articles are my notes from studying weather theory and observing weather patterns.

- The Weather Notebook
- Weather Nets
- Weather Windows
- Daily Observations
- General Information
- Air Pressure
- Fronts
- Squalls
- Cyclones
- Winds
- Clouds
- Weather Forecasts
- Sea States

- Currents
- Fog

See also Chapter 5 for information about weather broadcasts and radio nets, Chapter 7 for using radar for storm avoidance, and Chapter 9 for listings of books on weather as well as links to useful Internet resources.

The Weather Notebook

Watching the weather was among the most important things we did during our cruising years. In the beginning we muddled our way through trying to learn about weather by reading books, and making notes from information we got over the radio or the Internet. Sometimes I spent 4-5 hours a day on weather issues. As it came time to create this section of the website, however, I was forced to sit back and think about how I did this which was a helpful exercise.

For a Weather Notebook I used a 100-sheet spiral notebook. One of these lasted about 6 months. On the outside front cover of the notebook I pasted the schedule of weather transmissions, including weather fax schedules, and Nets, noting the times (UCT and local), SSB channels, and transmission frequencies. Inside the front cover I kept a list of shorthand used in transcribing the NWS forecasts heard over the radio (following the method recommended by Bruce Van Sant in his book *A Gentleman's Guide to Passages South*.)

On the front pages of the notebook I made daily notes in chronological order, and used the back pages for identifying weather windows and making daily weather observations as described below. Note that weather observations made while we were underway were recorded in the Deck Log rather than the Weather Notebook.

In the daily notes section I jotted down the forecasts given on the radio nets, and also any important non-weather items that came up during the net. I used the margins for flagging the date, and referencing topics so that they stood out easily, and quickly yielded sought-after information when I looked for it later. The day and date were put in a rectangular box in the margin. Other items that I flagged in the margins were capital letters in a circle: "I" for safety and security incidents that were reported; "N" for navigation hints; "R" for radio frequency information; and "P" for emergency and priority items from the various nets (usually the boat names for which there was a watch underway).

The notes in the body of these pages were formatted as follows: next to the day and date, I listed the weather source (Net name or broadcaster) which was underlined so it was easy to see. Following the name, on the same line, I put the SSB channel and frequency, and the quality of the transmission (Readability on a scale of 1-5, with 5 being excellent, and Strength on the same scale.) Underneath this heading I made notes using a shorthand as described above. If a weather fax was received, a note of the time and title of the weatherfax chart(s) was recorded. If a text or Navtext forecast was received and stored on the computer, that was also noted. At the end of the last set of notes for the day, a line was drawn across the page.

When at anchor or docked, I also made daily weather observations on pages at the back of the Weather Notebook marked with vertical columns. Each of these pages thus became a table running across a single page. Each page had a column for recording:

- Date/Time
- Barometer;
- Wind direction;

- Wind speed;
- Relative humidity;
- Air temperature;
- Cloud description (type, height)
- Amount of cloud cover (% or eighths);
- Visibility;
- Wea state when observable;
- Comments (rain, thunderstorm, etc.)

A line in this table was filled out at the same time each day. If we were closely tracking a weather system, as in anticipation of the arrival of a storm or a departure, then a line was filled out more frequently, such as every 4-8 hours. Even when we were in harbor for an extended period, we kept track of the daily weather observations, as well as the NWS Offshore Report which we get every morning along with our e-mail from Winlink..

When in harbor I usually listened to at least one Net each day so we could hear about unusual happenings and find out what weather was heading our way. We got caught off guard one night in the Bahamas when we failed to do this and a storm came up in the night - we nearly lost our dinghy and some others in Marsh Harbour lost their boats.

Recording the weather each day does take some discipline, but there is no better way to begin to understand weather patterns in your area, and weather systems in general, than to really observe weather changes before your eyes over an extended period. When these observations are considered in light of the current forecast, even more insight is gained.

Weather Windows

A "weather window" for a coastal or offshore passage is an acceptable range of wind and sea conditions lasting for a long enough period to complete a passage (or remain safely in an anchorage) and which can reasonably be expected to occur with some regularity in the area to be transited, taking into account the modifying effects of nearby land masses.

Acceptable conditions depend on the course to be taken relative to the wind and swell directions. Bruce Van Sant in his book *The Gentleman's Guide to Passages South* offers a useful rule of thumb for comfortable passage-making in a small boat in the Caribbean. "For progressing directly into the wind, look for Beaufort Force 1. Add one Beaufort Force for each compass point working aft from the bow until reaching Force 6 when the wind is astern." In other words, if wind and course direction are similar, stronger winds are acceptable - in fact desirable, for a faster passage. Conversely, if wind and course direction are opposing, then lighter winds are necessary to make way in reasonable comfort. As an example, we defined a weather window for travel against the trade winds from Luperon in the Dominican Republic to Boqueron in Puerto Rico as "a 4-day forecast of winds east to southeast less than 15 knots, seas 3-5 feet, no northerly swells." We thought it was a good idea to put in writing a description of the required weather window, because then it became internalized and it became more obvious when one was coming as we tracked the weather forecasts.

Tracking forecasts requires the use of some kind of form. The one we used is made up according to the sample given by Bruce Van Sant in the above-referenced book. While this form was formatted for Caribbean weather tracking, it should fit most other situations.

The form was made by dividing a page of the weather notebook into 3 sections of columns as follows:

- The first (left hand) section had 5 columns for:
- Day/date;
- Forecast area;
- Wind direction;
- Wind speed; and
- Swell height/direction.

The second and third sections were identical, and both were divided vertically into 4 columns. This allowed the tracking of forecasts as we moved from one forecast area to another. In the second section of the form we initially tracked an 80-20 mix of the NWS Offshore Forecast for the Southwest North Atlantic (SWNA) and the Eastern Caribbean. In the third section we tracked the forecast for a 20-80 mix of the two forecasts. As we moved south through the Caribbean instead of the SWNA we tracked the Tropical North Atlantic and the Eastern Caribbean forecasts. Each section had a column for:

- Wind direction;
- Wind speed;

- Swells; and
- A narrow column for an up or down arrow, to indicate that the forecast is better or worse than on the previous line - a short horizontal line indicates there is no change.

I used one line of the form for each day's forecast. For the current day, i filled out the forecast line in ink. For the subsequent days of the forecast i wrote the lines out in pencil, so they could be erased and changed as/if subsequent forecasts change. In the first section we wrote data for the first forecast area in the upper part of the line, and for the second forecast area in the lower part of the line.

When I saw a weather window coming up, I highlighted the date it began in yellow and began departure preparations. If the window held up, I kept on highlighting the next date of the window as the days unfolded, and made decisions as to the timing of departure.

While underway on a multi-day off-shore passage, weather forecasts continued to be collected to see if the length of the window was shortening or lengthening.

Recording the forecast information in this way made it easy to see a weather window approaching. If departure is delayed until a window is forecast, even if the forecast is wrong conditions are extremely unlikely to deteriorate so badly that the passage is truly miserable. Of course, if a passage takes longer than the weather forecasts reach out, then other considerations must be taken into account as is the case for ocean crossings.

On the next page is an example of the table in the Weather Notebook tracking a weather window in the Caribbean.

Figure 1 - Sample Page for Tracking Weather Window

DAY	Dir	Speed	Swell	8-20 SWNA-EC	20-80 SWNA-EC	Wind
MON 12/30	SWNA	NE-E	15-20	6-8'	Dir	Speed
Tue 12/31	EC	E	15-20	6-8'	NE-E	15-20
Wed 1/1	SWNA	E	20	7-9'	E	20
Thu 1/2	SWNA	SE-S	15-20	6-8'	SE	15-20
Fri 1/3	EC	E	20	6-8'	SE	15-20
Sat 1/4	SWNA	SE-S	15-20	6-8'	SE	15-20
Sun 1/5	EC	E	20	6-8'	SE	15-20
Mon 1/6	SWNA	SE-S	15-20	6-8'	SE	15-20
Tue 1/7	EC	E	20	6-8'	SE	15-20
Wed 1/8	SWNA	SE-S	15-20	6-8'	SE	15-20
Thu 1/9	EC	E	20	6-8'	SE	15-20
Fri 1/10	SWNA	SE-S	15-20	6-8'	SE	15-20
Sat 1/11	EC	E	20	6-8'	SE	15-20
Sun 1/12	SWNA	SE-S	15-20	6-8'	SE	15-20
Mon 1/13	EC	E	20	6-8'	SE	15-20
Tue 1/14	SWNA	SE-S	15-20	6-8'	SE	15-20
Wed 1/15	EC	E	20	6-8'	SE	15-20
Thu 1/16	SWNA	SE-S	15-20	6-8'	SE	15-20
Fri 1/17	EC	E	20	6-8'	SE	15-20
Sat 1/18	SWNA	SE-S	15-20	6-8'	SE	15-20
Sun 1/19	EC	E	20	6-8'	SE	15-20
Mon 1/20	SWNA	SE-S	15-20	6-8'	SE	15-20
Tue 1/21	EC	E	20	6-8'	SE	15-20
Wed 1/22	SWNA	SE-S	15-20	6-8'	SE	15-20
Thu 1/23	EC	E	20	6-8'	SE	15-20
Fri 1/24	SWNA	SE-S	15-20	6-8'	SE	15-20
Sat 1/25	EC	E	20	6-8'	SE	15-20
Sun 1/26	SWNA	SE-S	15-20	6-8'	SE	15-20

Understanding Marine Weather

This article contains notes that I made as I attempted to unravel and master the mysteries of marine weather. Many of these came from studying weather using the Starpath Weather Trainer. Others came from studying various texts on marine weather, attending weather courses and seminars, and from observation and experience.

An understanding of weather patterns, how they differ in different areas, and how they change within those areas is an essential part of seamanship. I invested a significant amount of my time on this topic since we hoped (optimistically as it turned out) to sail whenever possible and minimize use of the engine. We also had no desire to get caught out in dangerous conditions. While we knew that *Callipygia* could get through pretty much anything, we were not so sure about ourselves as crew.

1. General Pointers

- Weather planning for smaller vessels is based on long-term data regarding conditions over an area, and knowledge of how the ship and crew perform under these various conditions.
- 1 cubic yard of water weighs a ton, so in rough weather if cockpit drains or scuppers don't empty quickly, a boat can quickly become unbalanced.
- Most of the time in weather forecasting you are looking for good weather and not trying to avoid bad weather. Understanding weather allows you to find the most favorable winds and route so that you can catch favorable 15-20 knot breezes.
- There is not much you can do to avoid a fast moving bad weather system when you're on a passage going at 6 knots so best to see it coming and stay out of the way.
- If the latest weather forecast suggests the need for significant course alterations, make half of it and then wait 6 hours for the next forecast and/or confirmation from your own observations before making the full course alteration.
- In many cases, heading offshore for a coastal passage is equivalent to adding days to get into rougher conditions.
- In the upper atmosphere (jet stream), long waves create the storm track, short waves create the storm.
- In the N Hemisphere, lows (cyclones) go anticlockwise and highs (anticyclones) go clockwise. Thus, put your back to the wind, your left hand out and 20 degrees forward to find the direction of the center of the low (Buys Ballot law - Remember BBLL=Buys Ballot says Back Left to Low in the Northern Hemisphere. In SH use Right Hand).
- The significance of dark nasty looking weather depends on which direction it lies in relation to the general direction that weather moves in your location.

- Extratropical cyclones form outside the tropics any time of year but most often in winter, are numerous (about 1,500 develop per year), form over land as well as sea, move west to east, span 700-1,500 miles, have cold cores, have their strongest winds on the periphery, don't have an eye, and have associated fronts. They often reach gale force but except in the North Pacific rarely reach hurricane force.
- Tropical cyclones form in the tropics generally in a specific season, are relatively few (70 per year), form over water, move east to west for part of their lives, span 2-300 miles, have warm cores, have strongest winds (over hurricane force) near the core, have a calm eye, and don't have fronts.
- Veer = shift (clock) to the right in both hemispheres. Back = shift to the left in both hemispheres.
- On clear days, visibility is about 10 miles. The visible range of land is $1.14 \times$ the square root of the height of land above observer's eye.
- A ridge is an elongated area of high pressure, identified by the area of maximum anticyclonic curvature of wind flow. A trough is an elongated area of low pressure, identified by the area of maximum cyclonic curvature of wind flow. A trough is distinguished by its elongated nature as compared to a low (or cyclone) which is circular. A large scale trough may contain one or more lows.
- Get a weather map and mark your position on it. Note the time for the map. From your log, check the wind speed, direction, and barometer. Figure out what the map suggests your wind speed, direction, and barometer should be. Compare notes. Mark your COG on the weather map, figure the next day's run, and plot your likely position. Keep this and study it as new forecasts are issued. Listen to voice forecasts and fill in details. Compare with previous projections.
- Isobars in the warm sector typically align with winds aloft (in 500mb chart). Surface storm track is usually 300-600nmiles north of and parallel to the 5640 meter contour. Surface lows and fronts generally move along surface at a speed $1/3$ to $1/2$ of the 500mb wind speed.
- Surface winds in a low are typically $1/2$ of the 500mb wind speed.
- The key issue to applying what you learn from weather maps is how fast is your vessel. The tactical use of map information always involves projected DR position at the speed your vessel can make in the projected wind and wave conditions. It is much like taking current into account when passing through areas with strong varying currents. Good weather tactics are always tied to good navigation skills. The captain has to make the trade off between safe and fast.

2. Air Pressure

- The 1-2-3 rule. If pressure drops 1-2mb an hour over a period of 3 hours, watch out. Then use the 4-5-6 rule (drop of 4-5 millibars in 6 hours) which means something major is headed your way, if this happens you can be sure you are in for a gale--or worse.

- Reading and recording (on graph paper if you can) the pressure will ensure you are paying attention to air pressure. You need a barometer that not only tells you if the pressure is rising or falling throughout the range, but also accurately tells you what the pressure is. Without knowing the true pressure, weather charts are not as useful.
- You need a barometer that is accurate throughout its range and it should be calibrated, it's ok if it reads 3mb high, so long as you know that. Cost goes up with weight, and often just pay for more brass with no increase in barometer quality. Some of the best come in very thin brass and weight only 2lbs.
- General rule of thumb in the middle latitudes: Low pressure brings wind, clouds, and rain; high pressure brings light winds and clear skies (although you can get strong wind between two highs or if a high is pushed up against a stationary low). However, in the tropics winds tend to increase with high pressure.
- Diurnal variation is about 1-3mb with highs at 10 am/pm and lows at 4 am/pm. It is most prominent in tropics, in part because less pressure variation there.
- You can estimate the wind by spacing between millibars. But also, remember that wind can double going through gaps in mountains or between islands (gap wind). Also, note that close spacing in tropics produces much higher winds than at higher latitudes.
- There are 3 semi-permanent high pressure systems that really comprise the Horse Latitudes. They are stronger in the summer than in the winter. They are: Siberian High (over land), Pacific High, and Atlantic High (called Bermuda High when positioned westerly, Azores High when easterly). Their mean centers are between 30 and 40 degrees. You can tell if a high has become a "blocking high" that deflects or slows the usual west-to-east path of weather systems when: on the weather map they are in the correct place for the season; they are smooth and round with at least 2 isobars round them; and central pressure is +1030mb. The best spot to pick for getting round one is 2 isobars (8mb) from the center of the High. If the jet stream above develops an omega shape (omega block) the high can sit in the same place for a couple of weeks.
- Lows are circular depressions which can develop steep pressure gradients; troughs are elongated low pressure systems which develop between 2 highs or more often as a projection out of a central low.
- Low pressure systems tend to move in a direction parallel to the isobars in their warm sector.

3. Fronts

- A front is the boundary between cold(er) and warm(er) air with the temperature and pressure differences producing strong winds at the boundary.
- There are 4 types of fronts: Warm (Rain, leading to mist/fog, stratus clouds, temperature slowly rising, moves at 10-15 knots). Cold (Heavy rain at front, then showers, cumulonimbus, rapid temperature drop, moves at 20-25 knots and much

faster in higher latitudes). Occluded (steady rain then squally, stratus then cumulonimbus (Cb), moves at 10-15 knots, temperature may rise or fall). Stationary (intermittent rain then clearing, lowering stratus (St) then Cb, temperature slowly rising, moving slowly or not at all).

- Wind shifts at passage of a front in the northern hemisphere will be a permanent veer--when facing the wind, it will shift (clock) to the right. As a front approaches off shore, winds back as the wind builds, then suddenly veer and then either steady out or dissipate after the frontal passage.
- Warm front has a classic cloud sequence. This is more obvious in summer than winter. Sequence unfolds over 12-36 hrs, usually a day.
- From cloudless sky, comes a 22 degree diameter (thumb to pinky stretched) halo round sun/moon showing ice crystals have invaded the upper air (?stratosphere). Then building cirrus appears coming over the horizon. [Note cirrus sometimes show up at the tail end of a passing cold front, so when you see them coming over the horizon from a clear sky, then it means warm front is coming.] The cirrus thicken into cirrocumulus and/or deepen into altostratus then stratus. Then it starts to rain (nimbostratus) at roughly half way time-wise to the actual front and it will keep on raining until the front arrives. During this time the barometer will slowly drop and winds may back a bit. When the front comes, the winds will be gusty and suddenly veer. Once veered (front passes) wind speed and direction will remain steady as you move into the warm sector, and there will be stratocumulus or mixed clouds and some rain.
- Cold front typically follows warm front in a day or so during which period you are in the warm sector. The cold front is seen as a wall of tall dark clouds. When the front arrives the winds will increase rapidly and be gusty and there maybe thunderstorms with the rain. At passage the winds will suddenly veer, and the skies will gradually clear. Often there is a clarity and freshness in the air after a cold front goes through.
- Cold fronts can travel on their own without a warm front. But you almost never get a warm front without a following cold front.
- Occluded fronts (where a cold front has caught up with a warm one) approach as a warm one does, but the front itself has characteristics of both--it is just plain bad weather.
- Sometimes an isolated low or trough will approach much as a warm front does with winds backing round and building and then veering as the low passes. However the veer is gradual, not sudden as at a front.
- When an isobar crosses a front it is V-shaped and points away from the low. You determine the expected wind shifts from this.

4. Squalls

- A squall is a cumulonimbus cloud gone out of control. Once the anvil appears, it is decaying.

- The motion (direction it is moving) of a squall is veered about 30 degrees from the ambient wind direction. The first wind will hit you from the direction of where you see the squall. Watch the bearing of the center of the squall to decide if you're on a collision course, or if you will pass in front of or behind it. As with a big ship, try to pass behind it, since the winds in front of a squall are much much stronger than the winds behind.
- The strongest winds come with the first heavy rains. If it starts raining lightly, you have missed the worst of it. Squalls are over in 20-30 minutes. The strongest winds are at the leading edge (the cold dome) which extends about 2 miles out in front. The taller and blacker they are, the worse they'll be. Winds at the leading edge are typically 20-30 knots, with gusts to 40 knots.
- Once you've been through a few squalls, you will be able to judge their intensity potential. Note that squalls produce wind in downdrafts. Sometimes a "downburst" of much greater intensity occurs (micro or macro depending on diameter) where winds can reach 100 knots. The danger from a downdraft is the suddenness and force with which the wind strikes. This is magnified if the windspeed is intensified to downburst levels.
- Instability lines are long (possibly discontinuous) lines of thunderstorms, may be 100s of miles long and 10-50 miles wide. They form usually in the warm sector of an extratropical cyclone.
- Squall lines are mature instability lines, containing several squalls, typically 100 miles ahead of a fast moving cold front.
- Waterspouts are tornados occurring over the sea. They are not uncommon in the Bahamas and have been sighted as far north as Puget Sound. They occur in severe weather, and touch the water for about 10 minutes. They descend from the base of cumulonimbus, primarily in the area of squall lines moving ahead of a cold front. They are less severe than tornados, but nasty, and typically are short lived with the base touching the water from a few to 10 minutes.
- In the tropics on the ocean, squalls most often happen at night. Look at the clouds at sunset to get an idea of what's coming. If they are stratified or stratifying there isn't much instability in the air. If their cumulating there is and squalls are more likely. You rarely get an isolated squall. They travel in packs.
- In forecasting squalls, the thing to look for is vertical development ie cloud base to top relative to cloud height (sea to cloud bottom). If the height of the clouds is less than the ceiling, you just get big cumulus, there won't be enough instability to get cumulonimbus. If the height of the clouds is greater than the ceiling then watch out.
- To judge the severity of an approaching squall take note of the height of the cumulonimbus. the height of the ceiling, and the darkness of the cloud. Taller, lower, and darker are worser.

5. Cyclones

- When you get the first circular isobar around a low, it is called a cyclone. Need not be a storm. 2 circular isobars generally mean a storm is developing. The important thing is to notice the first circle.
- To avoid a tropical storm or extratropical low, head off in a direction that is forward of perpendicular to the direction the storm is travelling. The angle depends on the ratio of your speed to the storm's speed of travel. [See storm avoidance in our "Using Radar" notes.]
- The RHS of the path a Northern Hemisphere storm is the dangerous semicircle, with winds veering and pushing you into the path of the storm. The Left Hand Side is the navigable semicircle, with winds backing and pushing you out of the way. Also, on the Right Hand Side the rotary winds are increased by the speed of the storm's forward motion, and on the LHS the rotary winds are decreased by the speed of the storm's forward motion. Finally, the dangerous side is the direction in which the storm is likely to recurve and move towards.
- Surface storm track is typically 300-600nm north and parallel to the 5640 meter contour on the 500mb map.

6. Wind

- When the boat is moving, the direction of the true wind is always aft of the apparent wind, regardless of the point of sail. The faster you go, the more the apparent wind moves forward. The difference between true and apparent wind is largest when sailing with the wind on the beam. It is easy to misinterpret what's happening to the true wind. Watch the catspaws/surface ripples closely. Stare at them!
- Whenever the true wind changes direction, you know the isobars have moved. This is a signal that something is happening. It is easy to miss wind shifts when sailing, so always note the true wind as well as the apparent wind. A wind shift of 10 to 20 degrees can easily be lost when sailing on a reach by speed changes. Therefore, if boat speed picks up determine what wind attributes caused it. Was it a wind speed change or a change in wind direction - or both? Get in the habit of frequently deducing true wind direction.
- True wind and apparent wind are essentially the same when boat speed is below 20% of wind speed.
- Pressure gradient alone does not give wind speed, curvature of isobars also affects it.
- You know you are in the trade winds when, around 30 degrees N you find steady 15-20-knot winds from the NE/E with large well organized seas and small puffy cumulus following the wind.
- Land influences wind on the sea nearby and can have a greater influence than all but major weather systems – and it will affect how those play out. Therefore,

understanding the influence of land on the wind is essential for coastal sailing. Influences are two types: large scale regional effects that are included in local forecasts; and small scale effects that are not (though these may be referred to in the Coast Pilot).

- Another way of categorizing influences is into those caused by temperature and those caused by topography.
- Land and Sea Breezes are caused because land heats faster than water from sunlight, and cools faster in its absence. Note “sea breeze” means from the sea, a “land breeze” means from the land. In the absence of other weather patterns, these can cause significant winds. A sea breeze begins gently soon after sunrise and veering as it builds it gets strongest (about 10 knots) in late afternoon. After sundown, a land breeze then develops overnight. Land breeze typically is much lighter than the associated sea breeze, unless there are mountains in which case it may be stronger because of more and colder air falling down the mountainside at night. Classic sea breeze effect is found along straight featureless shorelines. In the morning, effects are noticed ½ -1 mile from shore, by afternoon effects are noticed as much as 10 miles out.
- A sea breeze in a confined area flowing through a mountain gap can reach 20-25 knots on a regular basis. These are usually well known and in planning, you can and should count on them to take advantage of or avoid them. In some areas gap land winds can reach more than 40 knots.
- Typically, sea breezes produce little puffy bits of cumulous at the top of a mountain in the afternoon. If you don’t see them as usual, and a sea breeze doesn’t come as expected, it means a low out to sea is sucking the air away. So watch out.
- When sailing along the shore in a 10-15 knot sea breeze, expect twice that wind at the entrance to a constriction (bay or river mouth). Look for white caps as you approach any turn or inlet.
- Land obstructions impede offshore winds to a distance about 8-10 times their height offshore. Rule of thumb: you will feel the wind diminish when you can span the obstruction with a hand width held at arms length. Also, a strong leeward wind will be deflected by a cliff, which will provide some protection.
- Gusts bring stronger winds shifted to the right. This gives you a lift (let's you head up) on the starboard tack but is a header (makes you head off) on the port tack. A lift is a windshift away from the bow, a header is a windshift towards the bow.
- Unless the wind is strong and the seas favorable it is usually slow and precarious to sail dead downwind. You will go faster to a downwind destination if you reach up a bit and jibe periodically.
- Winds from a storm passing over a constricted waterway are influenced by the topography. Generally storm winds will be deflected by the mountains to flow up or down the waterway, not across it.

- The wind near a flat shore will be more perpendicular to the shore and near a steep shore more parallel to the shore than the wind further off shore.
- Wind curls round a point. Head in to tack close to the point to get lifts from the wind curls, rather than heading out to tack.
- Wind speed will be higher for isobars with a distinct curve around a high, or lower for isobars curving similarly around a low. Note these predictions only work for winds outside the tropics. Trade winds are typically stronger than predicted.

7. Clouds

- There are 10 basic cloud classifications (genera) falling into four groups that all mariners should know:
 - High (base above 15-20,000 ft approx depends on lat) - Cirrus, Cirrocumulus, Cirrostratus.
 - Middle (base is 6,500-15,000 ft approx) - Altocumulus, Nimbostratus and Altostratus.
 - Low (base is below 6,500) - Cumulus, Stratus, Cumulostratus. and
 - Nimbocumulus (or Cumulonimbus) which can reach all the way from low altitude to high.
- In addition to the 10 cloud genera, there are 14 species, 9 varieties, and 9 features. If you have a grip on these, they pinpoint exactly where you are in a weather system.
- Clouds by themselves don't tell you a lot. Clouds plus barometer are better. Clouds, barometer, and wind shift is best—preferably with a weather forecast. A progression of cloud changes is necessary for forecasting—it is the sequence of cloud formation that tells you what might happen.
- Clouds are generally great for confirming what's happening now, rather than for forecasting what's going to happen – except for squalls and the development of tropical storms where reading the current clouds is invaluable. Once in a squall it is rain more than clouds that tell us what is happening.
- Layers of stratus imply stable air. Cumulus implies instability with vertical motion. If the height is bigger than the base, watch out.
- It is often hard to tell what kind of clouds you have, there may be a number of different types mixed up.
- Low dark clouds, mixing cumulonimbus and nimbostratus mean an approaching cold front, a squall line, or a squall (or the bar of a hurricane).
- Any change in the clouds which is not towards fair weather cumulus (cumulus humilis) means the weather is deteriorating (probably).
- Watching speed of clouds aloft helps tell if a coming front is severe or weak.

- As a rough rule, there is wind under cumulus. If stuck in light winds in a high, try to inch towards the clouds. Another way to find wind is to climb the mast with binoculars and look for roughness on the water surface. Generally low clouds move downwind slightly veered from the surface winds. Cumulus means there is an updraft under it. Thus as you go under, you will experience a wind shift, then back to the original direction. If there are rows of clouds you may experience oscillating winds—they shift under the cloud, then go back, then shift again. Watch for this and going downwind learn to predict when/if you need to jibe and jibe again.
- Apparent cloud height decreases with distance off (the angle of view decreases). To estimate cloud heights it is best to do it with those more directly above you.
- Rain clouds (nimbo-) are dark, sometimes black, on the bottom. As they fill up with rain they get flat bottoms, which then get raggedy again once the rain is over. Pay attention to the bottom of these clouds.
- Anvil top means the cumulonimbus rose so high the top winds blew its top off. It also means the worst is over.
- There are two basic types of clouds: stratus (layers) and cumulus (puffy). Often in the evening you get stratocumulus (puffy stratus). In the morning if you have this, watch to see if it moves towards cumulus or towards stratus. Cumulus means fair weather. Stratocumulus can form into bands or waves to show directions of winds above, but you really need cirrus or cirrostratus to tell high wind direction. Mix of stratus/cumulus features is called stratocumulus when low, but layers of altocumulus can look very similar at middle heights.
- Individual puffs of cirrocumulus (high) are smaller than in altocumulus (middle) which are smaller than cumulus (low). Practice trying to get a feel for cloud height.
- Stratus which hit the ground are fog or haze. You generally can't see the sun or moon through stratus, but you can more often see a watery sun through altostratus. Altostratus are the best sign that bad weather is possible (strong winds and long periods of high seas). They indicate a coming low before the barometer starts dropping. They usually tell you bad weather is coming in ½ a day or so.
- For telling wind direction, the wind is perpendicular to the wave pattern (just as with water). Cirrocumulus are best, altocumulus can indicate high wind direction. This is the direction the weather is traveling towards you. Waves in altocumulus look like rippled sand.
- Waves in altocumulus look more like rows of sheep.
- If you can see cirrus moving, then there is a strong wind aloft. If the cirrus is torn or raggedy that indicates strong winds too. Strong winds aloft tend to bring more severe storms.

- When looking for land from the sea, look for clouds that have formed above it from the sea breezes.

8. Weather Forecast Tips

- Keep a tape recorder near the SSB for recording weather information – or else learn a shorthand that allows you to accurately note what you hear.
- Coordinating the information you get from weather sources is important. Make a sheet that lists the local and UTs, in UT order, of weather broadcasts/faxes. Then note the data on the sheet so that what you collect makes a coherent picture.
- When you get a weather map, plot your position on it or draw the weather features on a sheet of clear plastic and lay it over your chart.
- With a calibrated barometer and wind instruments, you can judge where you are on the weather map. Practice doing this. Set your course based on forecasts so long as your own observations confirm what the weather map says. Weather maps are based on shipboard observations, and there will be fewer from bad weather areas. When a map forecasts a low or front to cross our path, we can be sure it will. Our job then becomes to figure out when that will happen and how the wind will change when it does.
- In mid-latitudes to discern whether weather is likely to change, look at the forecast map for the next day. The location, condition, and stability of highs is the main issue for predicting general conditions over a large area. Highs are either moving or stationary/blocking.
- Moving lows will disrupt the anticipated wind –however a blocking high may stop a low or a front or more likely deflect it polewards.

9. Sea States

- The sea state changes at the shelf. It is a good idea to draw the shelf on the chart with a highlighter and keep track where you relative to it, and noting what you experience at it.
- When trip planning, find out what direction the prevailing swells are in the region. Even with a favorable wind, going beam to seas is to be avoided. And, some anchorages become untenable with a swell from a certain direction.
- For an individual wave, the length in feet is the time between the two crests in seconds to the fifth. For a series of waves, the average wavelength in feet is 3 times the average time between crests squared.
- Swells come from storms that are coming or long gone. They are generated from a long way away.
- Significant Wave Height is the average height of the highest 1/3 of all waves. (SWH) In a wave, water doesn't move with the wave, but travels in a circle beneath the crest. In big seas, this water can be moving circularly at 2-3 knots.

- At sea, waves look bigger than they are, and in photos they look smaller than they are.
- Wave height builds whenever waves are slowed down by shallows (! their wavelength), opposing wind, or opposing current.
- Extreme storm (rogue) waves are much higher than the highest waves in a series, are most likely caused by a downburrst hitting the trough of a larger than average wave.
- SWH generally reaches ! the wind speed in a fully developed sea. Most probable wave height is ! of this, and average height is about .6 of SHW. About 1 in 2000 waves will be twice the SWH.
- As a rule it takes duration in hours equal to the wind speed in knots for seas to fully develop.
- In still water, you see white caps with wind speed of about 10 knots, in a contrary current 8 knots, and a following current 12 knots.
- When a weather report says waves of 6 feet, they are referring to SWH.
- Typically waves break when their height = 1/10 of their length, although they look menacing at 1/18.
- Waves when fully developed travel about .9 times the wind speed.
- Swells are separated from the wind that created them and have uniform height and length and are very wide. Waves are what we experience along with the wind that is creating them and have many heights, widths and lengths. Ripples are small wavelets that are experienced with (or close by) a wind of 1-3 knots, they look like fish scales. all three combine to make up the sea state.

10. Currents

- Approaching any harbor, careful monitoring is needed for sideways set of the tidal current.
- In most places where there are strong land/sea breezes as from land constrictions, there are strong currents from water constrictions.
- Figure both of them into your planning, since there will be times when they run against each other creating very nasty conditions. The wind and the current generally will flow in the same or opposite directions.
- The current is faster in the deeper parts of a channel.
- Learn to do current calculations for transiting coastal areas since fast currents can overwhelm a slow sailboat.

11. Fog

- Fog: 2 types, sea fog brought by the wind and often windy and foggy, and land fog (radiation fog) comes from the land, usually calm and burns off. You can predict fog if you plot the temperature/(relative humidity too?) and dew point for that temperature against time.
- Make sure you know and can recognize the meaning of fog signals. (See Chapter 4, The What If's?)
- In the fog, no-one has right of way. Nav Rules require proper lookout, safe speed, and take all actions to avoid collision. If you have radar you must use it properly.
- Fog signals: 1 long (4-6 seconds) blast every 2 minutes for vessel underway. You also should try to hear engines. If you hear vessel forward of the beam, stop. Make your own fog signal, two long blasts not less than every two minutes with two seconds between each blast (vessel under way but stopped.) Try to make connection on Channel 13 – give your GPS position if possible. Note that sound direction in fog is very unreliable.
- A good radar reflector is a must. You are not allowed, under the rules, just to drift unless you are at anchor. You need to have sails up and/or engine on so that you can move if necessary even though you may be stopped. If you think you are going to be collided with, head into the danger – you then can maneuver side to side if necessary, or take the blow on the bow which is much safer than on the beam.
- If you anticipate much travel in fog, you must get radar. There are no two ways about it.
- Nav rules require earlier avoidance action in fog if you have radar so that you never get near enough so that there is any risk of collision.
- The rules require, in a nutshell, that if the object is forward of the beam, turn right. If it is aft of the beam, turn away from the target. ie, turn right for all targets except one on the starboard quarter. If the target is forward of the beam, slowing is also a good idea. Maneuvers, as always, should be early and obvious (60 degrees).
- Local forecasts are more reliable for fog than for wind. Fog is forecast from temperature and humidity changes, which are locally measured quite precisely. Wind is forecast from distance between isobars which are only measured more globally.
- Fog comes in different types. Moist air moving over a cold surface is advection fog. Sea fog is this kind of fog where wind blows air from warm on to cold surfaces such as from warm or to cold currents, deep water welling ups, etc.
- Sea fog can cover large areas and moves with the wind. It can be foggy and windy at the same time. A sea breeze can bring a thick fog, which does not burn off. Radiation fog typically is formed in still condition as the air cools over land at

night and reaches the dew point; it burns off as the sun rises. You need to know what kind of fog you are in.

Chapter 9 – Useful References

We learned much about boating, sailing, and the cruising life by reading books, and during our time aboard the Internet was sufficiently well developed to be a great resource for problem solving. This Chapter consists of three articles reprinted from our website and hence don't have page numbers.:

Cruising Reference Books

- Seamanship
- Navigation
- Weather
- Sailing theory and skills
- Blue-water cruising
- Safety and survival
- Boat maintenance
- Natural history
- Miscellaneous

Sea Stories

Internet Links

- Weather
- Radio and e-mail
- Charts, Equipment, and Services
- General Information, Training, Membership
- Magazines
- Health, Travel, etc.
- Other Cruiser's websites
- Provisioning

And, finally, there are links to various odds and ends of information on our website that are somewhat applicable to the cruising life. These are:

- About Food
- Recipes
- Some Cruising Tips
 - Boat Cosmetics
 - Stowage Ideas

- Provisioning
 - Conserving Cooking Fuel
 - A Rigging Secret
- Downwind Sailing
- Bottom Blisters
- Rubber Bands
- Naming our Boat

Cruising Reference Texts

This article gives is a list of the boating and cruising reference books that we carried on board Callipygia. They are organized here into categories for ease of reference. We read, or referred to, many others and passed them on only because we couldn't keep them for lack of space. There is a wealth of knowledge out there on printed pages and one of us was addicted to reading everything s/he could lay hands on about nautical subjects. Note that this listing does not include instruction manuals for the onboard equipment which were kept by the Nav Station in the Equipment Instruction Binders, nor Cruising Guides for the regions we visited, or were planning to visit. On the latter, we tried to have more than one Guide so as to have different opinions and validation on navigation advice and anchorages. In addition, we carried appropriate government Coast Pilots or Sailing Directions and Light Lists for the areas we cruised in. We also had on board (at least for the duration of a visit) a Lonely Planet Guide for each country that helped us explore on land and enjoy the country's uniqueness. We carried Pilot Charts for the Oceans and Seas we visited, and large and small scale charts for the areas we crossed. None of these references are listed below, but we did carry an inventory of them (showing where they were stowed) and generally preferred not to dispose of the charts or guides we'd used just in case we might find ourselves back in that place again.

Needless to say, these guides and charts took up an increasing amount of space--and slowly encroached on the amount of space available for other non-boat-related references and resources. As a result, we gradually whittled down the number of non-boat books we carried so that (eventually) that library consisted largely of reference texts, with general reading material being left at book exchanges after we read them.

1. Essential Seamanship

- The Complete Sailor: Learning the Art of Sailing by David Seidman
- The Annapolis Book of Sailing and Seamanship by John Rousmaniere
- Handling Troubles Afloat by John Mellor
- Chapman - Piloting: Seamanship and Small Boat Handling, 61st edition published by Hearst Marine
- REED's Nautical Companion (Handbook to Complement Reed's Almanacs)
- The Complete Book of Anchoring and Mooring, revised 2nd edition by Earl Hintz
- Anchoring and Mooring Techniques Illustrated by Alain Gree
- Complete Guide to Anchoring and Line Handling by David G. Brown
- Dockmanship by David Owen Bell
- Staying Put -- the Art of Anchoring by Brian Fagan
- Easy on the Helm, Boat Handling Under Sail & Power by Tom Cunliffe
- Boat Handling at Close Quarters by Dick Everitt and Rodger Witt

- The Practical Mariner's Book of Knowledge by John Vigor
- Heavy Weather Sailing, 4th edition by Adelard Coles, revised by Peter Bruce
- How to Cope with Storms by Dietrich von Haeften
- Heavy Weather Tactics using Sea Anchors & Drogues by Earl Hintz
- Storm-Ready, Boatowners Guide to Hurricane Preparation by Richard Winer
- Storm Tactics Handbook by Lin and Larry Pardey
- Drag Device Database by Victor Shane
- Effective Skippering by John Myatt

2. Navigation

- Navigation Rules - International and Inland by US Coast Guard
- Navigation Rules (Rules of the Road) edited by David Burch
- How To Read A Nautical Chart - Complete Guide to the Symbols, Abbreviations, and Data Displayed on a Nautical Chart by Nigel Calder
- Dutton's Navigation and Piloting, 14th edition by Elbert S. Maloney
- Problems and Answers in Navigation and Piloting, 2nd edition by Elbert S. Maloney
- Radar Afloat - Official Background Reader to the RYA Radar Course by Tim Bartlett
- Celestial Navigation for Yachtsmen, revised by Mary Blewitt
- Celestial Navigation for Sailors by Tom Tursi
- Reed's (or MacMillan Reed's) Almanac for current year
- Nautical Almanac for the current year
- Ocean Passages of the World, 4th edition British Admiralty
- World Cruising Handbook, 3rd edition by Jimmy Cornell
- World Cruising Routes by Jimmy Cornell
- H.O. 249, Sight Reduction Tables for Celestial Navigation for current epoch
Defense Mapping Agency
- The Sextant Handbook by Bruce Bauer
- Emergency Navigation by David Burch

3. Weather

- Mariner's Weather by William P. Crawford
- Marine Weather published by the Florida Maritime Institute
- Mariner's Weather Handbook by Steve and Linda Dashew

- Weather Predicting Simplified - How To Read Weather Charts by Michael William Carr
- The Concise Guide to Caribbean Weather by David Jones
- The Weather Handbook, 2nd edition by Alan Watts
- Instant Weather Forecasting by Alan Watts
- Instant Wind Forecasting by Alan Watts
- The Weather Wizard's Cloud Book by Louis Rubin Sr., and Jim Duncan
- Understanding WeatherFax by Mike Harris
- Worldwide Marine Weather Broadcasts published by NOAA
- Admiralty List of Radio Signals published by the British Admiralty Office

4. Sailing Skills (see also Section 1, Essential Seamanship)

- Yacht Handling Under Sail by David & Charles
- Sailing in Windy Weather by Richard Henderson
- How to Trim Sails by Peter Schweer
- Sailing Fundamentals by Gary Jobson
- Illustrated Sail and Rig Tuning by Ivan Dedekam
- Sail - Training Manual of the US Power Squadron

5. Blue Water Cruising

- The Voyageur's Handbook by Beth Leonard
- Handbook of Offshore Cruising by Jim Howard
- The Seaworthy Offshore Sailboat: A Guide to Essential Features, Handling and Gear by John Vigor
- Nigel Calder's Cruising Handbook by Nigel Calder

6. Safety and Survival

- Safety Recommendations for Offshore Sailing published by U.S. Sailing
- Federal Requirements and Safety Tips for Recreational Boats published by US Coast Guard
- Survivor by Michael Greenwald
- The Captain's Guide to Liferaft Survival (This book lived in the ditch bag.)
- Storm Tactics Handbook: Modern Methods for Heaving To for Survival in Extreme Conditions by Lin and Larry Pardey.

7. Boat Systems and Maintenance

- The Complete Rigger's Apprentice by Brion Toss
- Understanding Rigs and Rigging, revised by Richard Henderson
- Keep Your Marine Diesel Running--Care and Preventive Maintenance for the Boater by Richard Thiel
- Boatowner's Mechanical and Electrical Manual, 2nd edition by Nigel Calder
- Marine Diesel Engines, 2nd edition by Nigel Calder
- Shop Manuals for diesel engine and outboard motor
- Outboard Engines by Edwin Sherman
- Sailboat Electrics Simplified by Donald Casey
- Boater's Guide to VHF and GMDSS by Sue Fletcher
- Mariner's Guide to Single Side Band Radio by Frederick Graves
- Marine SSB Simplified by Gordon West
- ARRL Operating Manual published by the American Radio Relay League, details ham radio procedures
- Passport to World Band Radio from International Broadcasting Services, Ltd.
- This Old Boat by Donald Casey
- Sailboat Hull and Deck Repair by Don Casey
- Inflatable Boats--Selection, Care, Repair, and Seamanship by Jim Trefethan
- Sailor's Secrets-Advice From the Masters published by International Marine
- Best of SAIL Magazine's Things That Work published by SAIL Magazine
- Why Didn't I Think of That? by John and Susan Roberts
- Modern Boat Maintenance edited by Bo Streffert
- Quick and Easy Boat Maintenance by Sandy Lindsey
- Sailing Tips - 1,000 new ways to solve old problems by William M. Burr, Jr.

8. Natural History

- Birds of North America by Kenn Kaufman
- The Sibley Guide to Bird Life and Behavior published by the Audubon Society
- Sibley's Birding Basics by David Allen Sibley
- A Guide to the Birds of the West Indies by Raffaele, et al
- Shorebirds, an Identification Guide by Hayman, Marchant, and Prater
- Seabirds, an Identification Guide by Peter Harrison

- The Cruiser's Handbook of Fishing by Scott and Wendy Bannerof
- Saltwater Fish and Fishing Simon and Schuster Guide
- Dangerous Marine Animals, 3rd edition by Bruce Halstead
- Secrets of the Night Sky--The Most Amazing Things in the Universe You Can See with the Naked Eye by Bob Berman
- Astronomy - A Self Teaching Guide, 4th edition Dinah L. Moche

9. Miscellaneous

- Boatowner's Handbook: Reference Data for Maintenance, Repair, Navigation, and Seamanship by John Vigor
- The Splicing Handbook, 2nd edition by Barbara Merry
- The Klutz Book of Knots by John Cassidy
- Oxford A-Z of Sailing Terms by Ian Dear and Peter Kemp
- Introduction to Knots, Bends, and Hitches (Marlinspike) - U.S. Power Squadron training manual
- Yacht Cruising - bag of tricks Patrick Ellam
- First Aid Afloat by Robert Haworth
- Advanced First Aid Afloat by Peter Eastman MD and John Levinson MD
- The Onboard Medical Handbook by Paul G. Gill, Jr, MD
- The Merck Manual of Diagnosis and Therapy published by Merck & Co., Inc
- Yachtsman's Ten Language Dictionary by Barbara Webb
- Spanglish for Cruisers
- Hammond World Atlas (paperback)
- World Almanac and Book of Facts published by Time, Inc.

Sea Stories

Most sailors love to read about the sea and I was no exception. I whiled away many a happy hour while cruising – and before and after it - carrying myself off into blue-water adventure through the lives and stories of other sailors. Here are some favorites:

- *Cochrane: The Life and Exploits of a Fighting Captain* by Robert Harvey. New York, NY: Carroll & Graf Publishers, 2000. An immensely readable biography of Lord Thomas Cochrane, England's ablest naval sailor and the man on whom Patrick O'Brien modeled the character and adventures of Jack Aubrey.
- The 20 Jack Aubrey/Stephen Maturin novels by Patrick O'Brian. Outstanding and eminently readable and re-readable novels giving great and historically accurate detail about sea life in the early English Navy.
- *Sailing Alone Around the World* by Joshua Slocum. The book that inspired me since childhood.
- *Pacific Graveyard* by James A. Gibbs. Portland, OR: Binford & Mort Publishing, 1963. A history of marine efforts and mishaps at the mouth of the the great Columbia River.
- The Hornblower series of novels by C. S. Forester, equally as well done though not as plentiful or comprehensive as Patrick O'Brian's more recent series (see above).
- *The Cochin Connection: Two Against the Drug Trade* by Brian and Alison Milgate. Great read about a gutsy pair of cruisers.
- *My Old Man And the Sea* by David Hays and Danial Hays. Father and son to Cape Horn.
- *The SHIP and the STORM: Hurricane Mitch and the loss of the Fantome* by Jim Carrier. Gripping and informative description of the forecasting and impact of a category 5 hurricane.
- *In the Heart of the Sea: The Tragedy of the Whaleship Essex* by Nathaniel Philbrick
- *The Boat That Wouldn't Float* by Farley Mowat.
- *Honey, Let's Get A Boat... A Cruising Adventure of America's Great Loop.* by Ron and Eva Stob. Description of a year on a trawler travelling on inland waterways.
- *The Brendan Voyage* by Tim Severin. Description of voyage replicating the boat and the route from Ireland to Greenland by early monks.
- *The Riddle of the Sands* by Erskine Childers. (Novel) Story built around foreign intrigue in the early part of the 20th century.
- *The Nautical Chart* by Arturo Perez Reverte. (Novel) Thriller about sailing and ancient charts.
- *The Greatest Sailing Stories Ever Told*, edited by Christopher Caswell.

- Gypsy Mother Circles the World by Frances Chichester.
- The Long Way by Bernard Moitessier.
- Fatal Storm: The Inside Story of the Tragic Sydney-Hobart Race by Rob Mundle.
- Fasnet Force 10: The Deadliest Storm in the History of Modern Sailing by John Rousmaniere.
- Rescue in the Pacific: A True Story of Disaster and Survival in a Force 12 Storm by Tony Farrington.
- At the Mercy of the Sea by John Kretchmer.
- Sailing Into the Abyss: A True Story of Extreme Heroism on the High Seas by William Benedetto.
- Endurance: Shackleton's Incredible Voyage by Alfred Lansing.

Cruising Links

This article gives links to Internet resources for cruisers. Most of these resources we used during our cruising period and found useful. Even though we no longer actively maintained this web page, we did check them periodically to remove or fix broken links.

1. Weather Information

There is a tremendous amount of information available on the Internet pertaining to weather--reflecting, we hope, the recognition that it is the Earth's air, water, and land that allows us to inhabit this wondrous corner of the universe, that releases the winds that allow us to sail across the seas, and that can destroy all of our constructions/artefacts in the blink of an eye.

- The NWS' Tropical Prediction Center gives an immediate picture of developing tropical storms.
- The latest Tropical Weather Discussion gives the most up-to-date NWS information on tropical system development.
- NOAA's Ocean Prediction Center continually issues marine warnings and forecasts. This website also provides access to weather forecast and fax schedules. The former Marine Prediction Center was renamed the Ocean Prediction Center on January 28, 2003. The website links previously had "mpc" in their URL's which is being changed to "opc". This website is undergoing change and is currently confusing to navigate.
- NOAA's Caribbean Weather Charts are found on a different part of the NOAA website.
- The Caribbean Weather Center was established and operated for many years by David Jones from Tortola, BVI. David provided forecast and routing information to sponsoring vessels. Sadly, David died on November 7, 2003, after an 8-month illness. In January, 2004, Chris Parker on Bel Ami took over the Weather Center and began providing weather advice to cruisers on the radio in the time-slot previously used by David Jones. 8104.0 USB at 0830 AST.
- Herb Hilgenberg provides weather and routing advice to boaters in the Atlantic, or even the Pacific. Listening to Herb is a must for an ocean or offshore passage. 12539.0 USB at 1500 EST.
- Locus Weather is a weather routing service operated by Ken McKinley in Camden Maine with links to Jenifer Clark's Gulf Stream.
- The National Weather Service main page provides access to marine and non-marine weather resources.
- NOAA's Satellite Images page gives satellite images showing cloud and moisture cover of the US, Caribbean, Atlantic, and Hawaii.

- The National Oceanic and Atmospheric Administration main page provides links to all NOAA agencies. Note that the organization of NOAA's website is a bit confusing, and changes periodically.
- The Navy's Weather Site provides access to weather information covering much of the world.
- NASA's Global Hydrology and Climate Center is a fount of information on weather and climatology.
- The Johns Hopkins Ocean Remote Sensing site is another useful resource particularly for the Gulf Stream Weather Buoy data are useful for finding out actual conditions reported from weather bouys in the National Data Bouy Center's system.
- San Francisco State University's Geosciences Center is a great place to learn about weather and internet resources.
- Starpath in Seattle offers software and training on marine weather, radar, navigation and other topics of importance to sailors.
- The University of Wisconsin Space Science and Engineering Department has abundant weather information and links.
- NASA's Oceanographic Resources webpage provides ocean information and links to oceanography research entities.
- The U.K. Met Office is the home page for weather forecasts in the United Kingdom.
- Sailor and Meteorologist Bill Biewenga's Home Page is a fun place to access and learn about weather.
- JVComm32 software for receiving weatherfax on a laptop can be downloaded from this site.
- The Center for Tropical Storm Risk in London makes useful predictions of hurricane risks each year.
- The University of the West Indies' Center for Seismic Research provides up-to-date information in volcanic and earthquake risk and activities in the Caribbean.

2. Radio and E-mail Resources

- This GMDSS (Global Maritime Distress and Safety System) website has been produced by the author of the Australian GMDSS handbook. The site is a good place to go to gain an understanding about this complex system which is changing radio communications (equipment and rules) on board cruising boats.
- Sailmail is a non-profit organization run by volunteers which provides the capability to send e-mail over the SSB radio using the marine frequencies. Subscription to Sailmail involves an annual charge, but no ham license is required and there are no restrictions on the content. Both Sailmail and its close cousin, Winlink (see next bullet) use Airmail software which can be downloaded

freethrough their websites. Together, the volunteers that run these two organizations provide an outstanding service to the cruising community.

- Winlink is a non-profit organization run by volunteer ham radio experts. Through Winlink, e-mail can be sent over the radio on the amateur frequencies, and weather information can be downloaded from the Internet. A General Class ham license is needed to subscribe to Winlink, which is free of charge. Because it uses the amateur frequencies, no business transactions can be handled through this means.
- The ARRL Band Plan shows which frequencies can be used for what purposes with which class of Amateur Radio License. Also the ultimate resource for all ham radio stuff. The American Radio Relay League is where to go for resources related to education, licensing, and the use of Ham Radio.
- The Caribbean Safety and Security Net is on the radio every morning to collect and disseminate information about safety and security incidents in the Caribbean.
- The Federal Communications Commission regulates use of the radio waves in the USA.
- The Cruising Club of America offshore communications memorandum explains how to operate the ICOM M710 and 710RT. Much better than ICOM's instruction manual. Also gives instructions for rigging an emergency SSB antenna in the event of a rigging failure.
- The Maritime Mobile Services Network provides communications assistance to cruisers travelling outside the USA.
- The Hurricane Watch Net provides communications assistance during periods with active hurricanes.
- The Cruiser's Log has a list of Radio Nets around the world.

3. Charts, Cruising Guides, Equipment, Supplies, and Services

- British Admiralty Charts for the UK and the Caribbean are now available in "Leisure Folios" (similar to the CYC folios for the Caribbean) consisting of a set of coastal and harbor charts of a chart-table size inside a plastic folio cover.
- Canadian Charts and publications provide useful coverage of Canadian waters.
- Blue Water Books and Charts was our US source for charts and cruising guides.
- Doyle Cruising Guides are essential references for cruising in the Caribbean.
- Marine Warehouse in Miami, with offices in the Caribbean, can locate items and ship needed equipment and supplies to the Caribbean for you.
- The Australian Yacht Winch Company. Callipygia had Barlow and Barient Winches. Both companies have gone out of existence, but after quite a bit of research we found we could get parts for winches here.

- SARCA (the Sand and Reef Combination Anchor) is manufactured in Australia where it is used by the Coast Guard and police as well as Australian cruisers. My crew learned about it from S/V Blue Heaven, who gave it a resounding recommendation for being suitable for both sand and rock in the Melbourne, Victoria, area.
- The Annapolis Port Book is a directory of marine equipment and service providers in the Annapolis, MD, area.
- The Boater's Directory provides leads to marine equipment and services in all regions of the US.

4. General Information, Membership and Training

- Seven Seas Cruising Association (SSCA) is an international organization, formed in 1952, to share cruising experiences and information among members cruising around the world. The monthly Commodores' Bulletin has no advertising, and consists of real accounts of the adventures of SSCA members in their own words. The SSCA has more than 10,000 members sharing the dream of sailing the seas as a lifestyle. This common aspiration bonds members into a caring, supportive family, which reaches out with international friendship and goodwill. Members are committed to leaving a "clean wake" by treating others and our environment with profound regard.
- You'll find a whole lot of information and useful links on the Cruising Resources website.
- Through the Power Squadron's excellent training program gave us basic training in Seamanship, Sail Theory, Coastal and Celestial Navigation, and Engine Maintenance.
- The Maryland School of Sailing & Seamanship gave us high quality hands-on and theory training on all aspects of cruising and navigation through their very thorough and comprehensive Sailing Certification Program.
- We did our final training preparations with Nautech Enterprises through a series of excellent training seminars held at the Maritime Institute of Training and Graduate Studies near Baltimore, MD. Thereafter, we completed our shakedown cruise as part of Nautech's New England 600 Cruising Rally in June, 2000. The NE600, from Annapolis to Camden, Maine, was specifically designed for beginning cruisers. Nautech was established by Jim and Margie Favors in 1998 when they themselves were preparing for the cruising life and realized there was a definite gap between what was being offered to cruisers and what was necessary for safe, successful, and well-planned excursions. Unfortunately, Nautech went out of business in 2005.

5. Magazines

- Practical Sailor is a monthly newsletter describing reviews and comparisons of sailboat equipment.

6. Travel, Health, and Other

- The State Department's Bureau of Consular Affairs gives you everything you ever need to know when planning to travel abroad. An excellent resource with health and safety tips and warnings, passport and visa information, and links to foreign country websites.
- The World Factbook gives maps, population, economic, government, transportation, and other statistics on every country in the world.
- IAMAT is a non-profit organization established in 1960 whose aim is to advise travellers about health risks, the geographical distribution of diseases worldwide, immunization requirements for all countries, and to make competent medical care available to travellers by English-speaking western-trained doctors.
- International Marine Insurance Services near Annapolis is where we get our boat insurance.
- SEARCH assists voluntary search and rescue organizations operating in the SW North Atlantic and Caribbean. Cruisers who venture into the Bahamas and on down the Greater and Lesser Antilles should be aware of the limitations of emergency services to come to their assistance, should they need help. If you are used to the comforting umbrella of the US Coast Guard being on the other end of your VHF radio, you should be aware of limitations far from the US coast. Whilst the Coast Guard does give itself a responsibility for this whole region, as a practical matter cruisers' primary sources of assistance in an emergency are local search and rescue (SAR) facilities (if any) of the nearby countries. SEARCH supports several voluntary organizations scattered over this region. As you move away from the US, these are: (a) BASRA Nassau; (b) Turks & Caicos Rescue Association (TACRA); (c) VISAR in the British V.Is.; (d) St Maarten Sea Rescue Foundation (SMSRF), with units in nearby Saba and St Eustatius; (e) CITRO in Curacao; and (f) Search & Rescue Foundation of Aruba (SARFA).
- Noonsite aims to provide a one-stop website featuring essential information on all matters of interest to sailors planning an offshore voyage anywhere in the world, whether already underway or still in the preparatory stages. Noonsite is the culmination of Jimmy Cornell's work on the global cruising scene for the last quarter of a century and a distillation of his best-selling books *World Cruising Handbook* and *World Cruising Routes*.
- Sailnet is a handy resource for sailors and cruisers. In particular, we've found it's e-mail archives useful in researching specific boat problems, and periodically we participate in its very active e-mail Listserv for communication among Tayana owners.
- St. Brendan's Isle is the mailing service in Florida we used while cruising, and still use now that we're on land. This is run by former cruisers, Doug and Linda Moody.

- The U.S. Coast Guard website allows for online processing of forms and is a source of information about the agency.
- The Seismic Monitor provides immediate information in seismic activity worldwide.

7. Websites of Other Cruisers and Sailors

- Visit our friends on Chinook of Canada and see all her travels
- A list from the SSCA provides access to dozens of cruisers' websites.
- The Cruising Yacht Sitering is based in New Zealand.
- Website of Chesapeake Bay sailor John Stephenson has many handy links, including to some very useful information provided by Whoosh for cruisers crossing the Atlantic to the UK.
- We first met Jasp (Joe, Amanda, Sam, and Paul) on their Island Packet 40' in Guadeloupe.
- The Cruiser's Log has links to websites of many other cruisers.

Provisioning

- Grabill Country Meats ships excellent canned beef, chicken, turkey, and pork. These products have no additives and we used them much of the time when fresh meat was unavailable or of dubious quality. We loved this stuff!
- Brinkman Turkey Farm Another source for canned meat, including ground meat which is reputed to be terrific.
- The Washington State Creamery produces canned cheeses.

About the Author

Pat Watt was born in Scotland, where she learned to sail as a child. Emigrating to the USA in 1962 she raised a family and returned to the workforce. Her love of the sea resurfaced in 1995 when she acquired Tempus Fudgeit, a Pearson 27' sloop. She relearned her sailing skills and became a wannabe blue-water cruiser. In 1999, upon turning 60, Pat took up running, and that fall completed the Marine Corps Marathon, finishing in the middle of her age group. That experience taught her that a person can do anything he/she puts his/her mind to. Upon retirement, she and her partner, Bill Dillon, put their minds to roaming in the wild blue yonder and bought *Callipygia*, a Tayana 37' cutter. They wished they'd started when they were younger. After four years and 7,500 miles, they hung up the sailor caps and moved aboard a 24' Minnie Winnebago to go land cruising for another four years. The rest is history – or at least it's documented on the Trouser Rollers web site: <http://www.callipygia600.com>.