Published in the United States of America in 1995
by the United States Sailing Association

ACKNOWLEDGMENTS

US SAILING would like to thank all the people who reviewed and contributed invaluable input to this manual: Dick Allsopp, John Bonds, Tim Broderick, Steve Colgate, Rick Hamill, Richard Johnson, Jo Mogle, Tyler Pierce, Gene Schwantes, Ray Treppa, Ron Trossbach, and Ray Wichman.

And special thanks to:

Lynda Morris Childress, Managing Editor of *Cruising World Magazine*, who contributed the material, "Purchasing a Boat," for Section 5 - Boat Chartering and Purchasing Information.

Kurt Holland who contributed the material for Section 1 - Cruising Instructor Responsibilities.

Sheila McCurdy who wrote Section 3 - Basic Cruising Highlights and Section 4 - Bareboat Cruising Highlights.

Amy Ullrich, Managing Editor of *SAIL Magazine*, who contributed the material "Chartering a Bareboat" for Section 5 - Boat Chartering and Purchasing Information.

TABLE OF CONTENTS

SECTION 4 -- BAREBOAT CRUISING HIGHLIGHTS

SECTION 5 -- BOAT CHARTERING AND PURCHASING INFORMATION

SECTION 1

CRUISING INSTRUCTOR RESPONSIBILITIES

CRUISING INSTRUCTOR RESPONSIBILITIES

Our responsibilities as US SAILING Cruising Instructors may seem self-evident, yet experience with new instructors in the challenging environment of cruising courses using expensive and often complex auxiliary sloops has shown that it warrants our and your attention.

Broadly speaking, a Cruising Instructor should:

- Maintain the safest possible training environment
- Maintain US SAILING's educational standards
- Create achievable challenges for students

all while ensuring **students *have fun!***

In the process of achieving these goals any instructor, regardless of his or her experience, can encounter potential problems such as medical emergencies, gear failure, unrealistic expectations, argumentative students, heavy weather, and particularly the problems relating to personal relations, drugs and alcohol during live-aboard courses.

While it is difficult to provide answers to every conceivable situation, US SAILING has developed clear guidelines regarding instructors' professional behavior. These have been developed from the actual experiences of veteran instructors in their cruising courses.

There are five entities to whom an instructor owes care and responsibility. They are:

1) The student
2) You, the instructor
3) Your employer
4) US SAILING
5) The sailing community at large

YOUR RESPONSIBILITY TO YOUR STUDENTS

Know your Students. Students have multiple needs, many of which they are unaware when they come to the first session. A golden rule when encountering students for the first time is ***ask questions***. Three questions that have particular importance are:

> ☞ **A REMINDER FOR INSTRUCTORS...**
> Your primary responsibility is to give your students a **SAFE, FUN, LEARNING** experience, and help them achieve their sailing goals.

- Have you any particular goals for the weekend/week? (Also long term goals.)
- What experience do you bring to the class today?
- Are there any medical issues that should be taken into consideration? (Also provide a private written opportunity to elicit this important information.)

Mutual Learning Objectives. This is also your opportunity to clarify the class objectives, schedules, your teaching style/philosophy, and most important to form a *mutual learning objective*. After discussion take a moment to paraphrase each student's goals as they relate to and can be achieved by your course. This has several useful benefits:

- Clear goals allow focused presentations, which keep you on track
- Limits superfluous subjects and activity
- Develops group dynamics by providing mutual goals

Never fail to take time to learn about your students, it pays huge dividends.

Safety. This is a critical topic to all who teach sailing and seamanship. Beyond the practices of wearing PFDs and safety checking the boat every day, many of us agree that other safety issues are important too, but we often ignore them. Bearing in mind the educational nature of what we are doing, **we should think in terms of *safety education goals*.**

- **Be observant** -- In those first few days, teach a new way of thinking -- to notice everything, and to make that level of awareness so habitual that it becomes habit. *Head out of the boat -- always looking around.*
- **Be communicative** -- Creates a sense of teamwork and orderly cause and effect.
- **Be forehanded** -- By example and coaching, encourage the students' to anticipate and plan two or three boat lengths -- or days -- ahead of their track.

- **Have composure** -- Control of one's self is the fastest way to instill confidence in students, and it "role models" the ideal skipper -- no yelling, ever!

What is important is that your students learn how to keep themselves safe. Set an example by taking the safest possible actions while teaching safe habits.

YOUR RESPONSIBILITY TO YOURSELF

Teaching sailing at the cruising level can be physically exhausting, mentally challenging and psychologically taxing. Because of the long duration of many cruising courses with their live-aboard nature, there is often little time for a mental break for the instructor. Often you and your class are far removed from support services and opportunities for guidance from managers. This leaves the instructor in the position of Head Instructor, Safety Officer, Mechanic, Cook, Counselor, Sailing Guru. Lest this sounds too negative, it should be pointed out that instructors teaching these courses have gained many long-term friends and experienced some of the most satisfying sailing of their lives. Because the opportunity exists for such positive things to occur, it behooves us to consider how we might achieve this. There are several golden rules:

- **Be prepared** -- Be physically and mentally ready -- sleep, food, and private time have to be built into your schedule.
- **Be creative** -- Recognize differing levels of motivation and skill by astute assignment of jobs and creative planning of activities.
- **Be straightforward and sincere** -- never indulge in "mind games" -- remember it always takes two.
- **Be objective** -- Treat everyone the same and with respect -- favoritism and a "romance" can lead to trouble aboard a boat, and is certainly not professional.
- **Be professional in your conduct** -- Alcohol or drug use is inappropriate while on duty -- exemplary behavior is expected of you.
- **Be open minded and keep informed** -- Arrange opportunities for your learning to continue.

If you do these things for yourself, you will also be fulfilling many of your responsibilities to your students, US SAILING, and your employer. Remember you are a professional

YOUR RESPONSIBILITY TO YOUR EMPLOYER

Doing a good job for your students is the primary duty of your responsibility to your employer. There are, however, problems that can occur. Marketing pressures often produce inflated expectations in students. Boats can develop problems as a result of poor maintenance. Instructors may contradict each other and undermine the program's credibility. Fortunately, these potential problems can be avoided by adhering to a few simple rules of thumb.

☞ A REMINDER FOR INSTRUCTORS...

Your responsibility to your employer includes:

- ✓ Being a professional
- ✓ Keeping your certifications and licenses current
- ✓ Abiding by all terms of employment
- ✓ Abiding by all laws and regulations
- ✓ Being punctual, respectful, courteous, and prepared

- Know your school's complete program -- students often ask about the next class option.
- Get in the habit of pre-checking boats and equipment that will be used for your class.
- *Never say* -- "That instructor is wrong; try it my way." Instead, **listen**, then explain the virtues of each method and why you prefer your approach.
- Attend instructor training and meetings held by your school to enhance your coordination with fellow instructors.
- Avoid speaking ill of any competitor, instructor or boats.

Disputes. Can occur with management, other instructors, or students when your multiple responsibilities conflict. Disputes should be avoided, and when they occur, be resolved quickly. Here are some practical suggestions that have been used successfully by other instructors.

- **Be honest** -- deliver the truth in palliative doses as soon as you discover it. Don't wait until the end of a week-long course to let a student know they are not going to get a certificate. Some students assume that attendance or payment for a course guarantees an US SAILING certificate -- make sure they know this is not so.
- Precede any lesson with the establishment of a mutual learning goal. Always be prepared to renegotiate as students comprehend their options.
- Constant use of the self-critique method of review will allow the student to grasp what is going on in any situation.
- Never rush anyone through a program or soft pedal bad news.

- Encourage management not to let students or "certificate collectors" rush through.
- When you become aware of a conflict, let the student know that you and the school will resolve it, even if that means a different instructor. They need to know the problem will be fixed.
- Management should establish clear conflict resolution guidelines.

It is necessary to anticipate them and create a process for their satisfactory resolutions.

YOUR RESPONSIBILITY TO US SAILING

When US SAILING confers certification to an instructor candidate, it vouches for that person's training and skill to perform the essential prescribed duties of a sailing instructor. By doing so it also lends its own name and reputation to the instructor's credentials. US SAILING does this to provide uniform national standards on which everyone may rely. Aside from the instructor, those who benefit include the sailing public, employers, sailing schools, charter and rental companies, insurance carriers, and any others who may find standardized skill documentation helpful in their decision making.

When an instructor lives up to the certification standards of US SAILING, it reinforces the value and perception of that certification for all who rely on it. If for any reason a certified instructor fails to live up to US SAILING standards, it reflects poorly on, and diminishes the value of, the credential for all US SAILING certified instructors.

To summarize, instructors support their employers and US SAILING by teaching well, safely and consistently. By use of syllabi, training programs and regular attendance at instructor meetings, we vastly reduce the chance for conflicts. Should conflicts arise anyway, we seek resolution though previously thought-out procedures with management. If all else fails, remember -- be honest -- no adult expects you to be perfect, yet all expect and deserve honesty.

YOUR RESPONSIBILITY TO THE SAILING COMMUNITY AT LARGE

This group can be defined as your fellow sailors, powerboaters, commercial vessels, and yes, even that port tacker you ended up ducking.

If you display a disregard for the navigation rules, proper weather monitoring or similar issues, you have hurt not only your students, and their family and guests, but the sailing community as large. Equally important is the negative effect poor instruction can have on our whole industry. How many potential sailing school students, boat purchases have been scared away by their friends' tales of scary dockings, unwieldy vessels and yelling skippers?

Our key responsibility to this group is simple -- provide well-trained sailors who can participate with respect for nautical rules and appreciation of the sea and its traditions.

Some thoughts to consider:

- Point out the cerebral quality of sailing. Encourage your students to think! To anticipate!
- Certify no one who is ignorant of either the navigation rules or good safety practices.
- Train students in nautical tradition and convention.
- Be seamanship. You may find yourself rewarded when you meet your students in an obscure anchorage aboard a "Bristol" yacht.
- Above all else, remember your habits will be magnified by your students and multiplied by their families.

Warm Southern Nights, Rum and Thou

Special pleasures and hazards await the instructor who teaches overnight cruising courses. These courses are especially popular to thousands of vacationers from the frozen north. The mixed nature of the course offering allows many differing perceptions to develop, flourish and possibly wreak havoc with your serene tropical sailing.

- To repeat -- never fail to establish mutual goals. It's perfectly acceptable for a student's objective to be merely competent crew or passenger. But if you don't ask, you won't know.
- A sense of personal space is critical. Try to have, at the least, a shelf or space where each student's books, sunglasses, and other personal articles can be stowed.
- Sequential long days can be exhausting. Vary lengths and starting times to allow everyone some private moments.
- Everything takes longer at sea -- and everything takes still longer when teaching at sea.
- Remember --FUN!

A sailors' admiral, Chester Nimitz, once reflected on a seamen's pre-eminent responsibility, written upon the loss of four destroyers to foul weather:

> "The time for taking all measures for a ship's safety is when able to do so, nothing is more dangerous than a seaman to be grudging in taking precautions lest they turn out to be unneeded. Safety at sea for a thousand years has depended on exactly the opposite philosophy."

SECTION 3

BASIC CRUISING HIGHLIGHTS

INTRODUCTION

The Basic Cruising section is an introduction to cruising with the expectation that a student who successfully completes Basic Cruising (BC) and Bareboat Cruising (BBC) will be comfortable and qualified to bareboat charter.

This section relies on the substantial material, advice and teaching tips detailed in the Basic Keelboat Instructor (BK) manual and will refer to those sections only going into more depth as needed to develop skills and to understand the common systems of cruising boats.

But certain key points bear repeating here for emphasis:

- **Personal preparation** is just as important -- if not more so -- as boats venture farther from land. Students must know what to expect and what clothing and protective gear to bring (Basic Keelboat Instructor manual, pages 1-3 to 1-7).
- **Safe physical activities and habits** should be emphasized and stretching exercises should be encouraged to loosen muscles for climbing, ducking, pulling, and twisting in ways that experienced sailors take for granted (Basic Keelboat Instructor manual, pages 1-7 to 1-17).
- **Terms, sail trim and essential boathandling maneuvers** are covered in depth in the Basic Keelboat Instructor manual (pages 1-18 to 1-84). A little more detail is included here, and again in BBC, but you will need to apply what you need for the type of boat being used and conditions existing during the course.
- **US SAILING appreciates feedback** from instructors to improve the usefulness of this manual. Please pass along comments and specific suggestions for course material or teaching aids and exercises to the Training Director, US SAILING, P.O. Box 209, Newport RI 02840.

Assumptions

In accordance with the standards being developed by US SAILING, the material in this section assumes that:

- Entering students have had a Basic Keelboat course or equivalent experience in the recent past.
- The course for BC will have a minimum of 16 hours of instruction.

- Most of the course will be with one instructor on board a monohull with auxiliary power and wheel or tiller steering.
- Students may earn skipper qualification.
- Students may earn a high wind endorsement if circumstances allow.

☞ **Successful completion of the course for Basic Cruising certification requires the student** to be able to responsibly skipper and crew an auxiliary powered cruising sailboat during daylight hours within sight of land in moderate wind and sea conditions.

Reminders to Instructors

"Student first, instructor second." Your job is to create a positive, fun atmosphere through which your students can best learn the foundations of sailing and seamanship, and want to learn more in the future. You are providing them the opportunity to move on to Bareboat Cruising where they can shoulder the responsibilities of bareboat chartering.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Remember that your professional appearance and manner not only reflect on your personal credibility, but also on the reputation of the sailing program for which you work.

- The goal of Basic Cruising is to enhance and practice the material in Basic Keelboat and to help students become comfortable handling a larger boat. Review sections of the Basic Keelboat Instructor manual as needed.
- Encourage students to sail or practice Basic Keelboat skills prior to taking the Basic Cruising course.
- Good water safety practices such as wearing PFD's and overboard recovery techniques still apply, and the environmental stresses of sun exposure and hypothermia must be recognized.
- Use the introduction to the course to reinforce good habits and to remind students of the material they should remember from Basic Keelboat: moving safely, not jumping, and keeping hands, feet, and heads away from potential danger.
- Develop interaction early. Students should be beginning to know enough to have questions. Find out early what each one expects to get from the course. Keep goals in mind, but stay open to changing expectations.
- Mental and physical comfort makes learning easier. Be aware of signs of discomfort. Students who had been quite happy on small boats inside a harbor may learn the symptoms of seasickness as they venture from protected waters.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Remember to give a short break every hour or so.

Your competence, enthusiasm, and presentation can make a huge difference on how much the students learn. You have a responsibility to give them your undivided attention. That attention involves give and take on both sides. You must watch and listen to them as much as they must understand what you are saying and showing.

ORIENTATION

Introduce yourself with both your first and last name (written on a board if convenient) and add something about yourself or how you view sailing. Have the students introduce themselves, and perhaps ask them why they are taking the course.

Briefly, outline course, time schedules, school rules and expectations, and requirements for successful completion of the course and Basic Cruising certification. Let students know that course payment or attendance does not guarantee certification.

Topics:

1) Orientation
2) Boat familiarity/boat tour
3) Weather check and prevailing local conditions
4) Systems overview/daily checks
5) Leaving the dock
6) Sailing a larger boat/crew work and safe operation
7) Shortening sail
8) Basic navigation
9) Emergency procedures/overboard recovery
10) Anchoring
11) VHF radio use
12) Maneuvering under power
13) Returning to the dock/clean up

Find out what students want to accomplish -- skipper vs. competent crew. Briefly explain the evaluation criteria used for skipper certifications.

TEAM BUILDING TIP...
To break the ice and help you and your students remember names, have your students say their names preceded by an adjective starting with the first letter of their name, i.e., Bold Bob or Cautious Connie. This exercise may also provide some insights about your students' personalities.

QUALIFICATIONS TO EARN BC CERTIFICATE...

- ☑ Safely operate boat's mechani-cal and electrical systems:
  - engine daily checks
  - bilge pumps
  - heads
  - galley safety
- ☑ Personal safety
- ☑ Cruising boat safety, including overboard recoveries
- ☑ Knot tying
- ☑ Safely operate deck gear:
  - self-tailing winches
- ☑ Steering with wheel/tiller:
  - sailing maneuvers
  - steering to compass course
- ☑ Dock and maneuver under power
- ☑ Proper use of spring lines
- ☑ Anchoring and mooring
- ☑ Reefing
- ☑ Simple VHF procedures
- ☑ Chart reading
- ☑ Basic navigation (piloting)
- ☑ Deal with routine tasks without explanation.
- ☑ Basic weather forecasting

CONCEPTS AND OUTCOMES

Good sailing cannot be separated from good seamanship.

Of course the students have come to your course to learn how to sail, but a *good* sailor knows more than the mechanics of sail trim and steering.

Here are some essential points to touch on:

- Cruising may be recreation but it involves a high degree of self-sufficiency as well. There are closer parallels in cruising to hiking and camping than touring by car.
- Students must master both the distinct skills of boat handling and more general knowledge of crew preparation, navigation, changing weather, verbal and nonverbal communication, and equipment maintenance.
- A cruising sailor continues to deepen his or her knowledge over a lifetime, and this course is a good place to start.

TEACHING TIP...
Remember to break out of lecture delivery style. Ask for examples. Check comprehension from time to time.

INSTRUCTORS TAKE NOTE...
Nonverbal communication examples are:
- Hand signals for sail trim and anchoring
- Aids to navigation
- Fog signals

The following are aspects of cruising that should become second nature to your students as they move from BC (Basic Cruising) to BBC (Bareboat Cruising) and beyond. The topics may be highlighted in an introductory session and then addressed into specific sessions and exercises of this course:

Vigilance

A sailor should have awareness of sounds, sights, and feel in and around the boat from bilge to horizon, and develop a sense of depth of keel and height of mast (plus antenna).

Sailing uses most of the senses:

- Sight -- watch for traffic, changing weather, double checking gear use.
- Touch -- feel the wind, the motion of the boat.
- Hearing -- listen to the sound of the wake, engine sounds, pumps running. In reduced visibility (rain, fog, darkness, snow), listen to bells, horns, motors, breaking waves.

- Smell -- notice distinct odors of land or spilled diesel.
- Taste is used least -- with possible exception of seeing if water in the bilge is fresh or salt. (A good reason to keep a bilge clean.)

Use of senses starts on the dock. Where is the wind? Is there current? Are there other vessels getting under way? Will the conditions be different outside?

Planning

Think ahead. Before setting out:

- Have proper gear on board.
- Use checklists.
- Check weather forecasts.
- Have a float plan.

> 🕮 **ADVICE FROM AN EXPERT...**
> *"Adventure is the result of bad planning."*
> Roald Amundsen
> *Polar Explorer*

and while sailing:

- Anticipate sailing maneuvers.
- Be aware of other vessels and potential for close encounters.
- Watch for signs of changing weather conditions -- squalls, fog, calms.
- Have back up-plans and alternatives in mind.

Good Crew Habits

Good habits help prevent common problems and accidents and make living on a boat with others easier.

- Safety precautions -- such as proper winch use and lookouts -- lessen risk of an accident.
- Systems checks -- such as monitoring a voltmeter and looking in the bilge -- help spot small problems before big ones occur.
- Tidiness -- such as coiling all lines the same way and stowing gear properly -- lessens confusion when something has to be done quickly by someone else.

> ✓ **HOT TIP FOR YOUR STUDENTS...**
> It is wise to remove rings and dangling jewelry, and to restrain "billowing" (long, loose) clothing and hair before sailing.

Control

Students must get a good feel for judging the behavior of a boat that is new to them. Allow students to make mistakes in safe and controlled conditions. There is no substitute for hands-on practice to understand that:

- Mass, inertia, and momentum of cruising boats vary -- Let the students experiment with the rate of acceleration, turning, glide zone, and stopping of the boat.
- Maneuvering in close quarters gets easier after the first time.
- Sail handling can become second nature.

Communication

Teamwork becomes more important on bigger boats. Communication becomes critical when one person cannot reach everything. Descriptive skills are also critical to many students who will have to explain procedures to their less-experienced crew of family and friends after the course is over.

Have students practice describing what is going on.

> ✓ **HOT TIP FOR YOUR STUDENTS...**
> Ranting and yelling are not effective communication. They are signs of incompetence and lack of control -- two of the worst character traits in a skipper.

Cruising Etiquette

The courtesies that have evolved in cruising should be introduced to students early. Examples:

- The last boat dropping the hook in an anchorage is the first one to move if a change in wind or current causes two boats to come too close.
- Only raft against another boat when invited to do so.
- If you need to walk across the other boat, step across the foredeck, not the cockpit.
- Ask permission before coming aboard another boat.

Legal Obligations

Important federal and state laws and regulations should be addressed.

- **Oil or plastics** may not be disposed of into waters of the United States or offshore.
- **Untreated sewage** may not be discharged on lakes or within three miles of the coast. Students should learn to use holding tanks and pumpout stations.
- **Alcohol intoxication** while operating a vessel is not good seamanship and it is against the law.

> ✓ **TEACHING TIP...**
> Remember the technique of "purpose/value statements." Convey to the students the "what" and "why" of the specific topics you address.

- **VHF radio** equipment requires an FCC license. The station license along with call sign is specific to the boat. For FCC license information, contact:

  FCC Marine Ship Service
  PO Box 358275
  Pittsburgh, PA 15251-5275

THE CRUISING BOAT

KEY CONCEPTS TO TEACH

- Familiarity with the boat
- Orientation

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Inspection of rigging and hull
- Check safety equipment

KNOWLEDGE SKILLS:

- On board fire fighting equipment
- Function of lifelines and pulpits
- USCG safety requirements
- Radar reflector
- Different stoves and fuel systems

The introductory session of the course may be onshore or on board, but generally students like to get on board the boat as soon as possible. Once everyone has been introduced, and you have explained the ground rules and the objectives of the course, give them a tour of the boat. This gives an overall familiarity with the boat before getting into details. Explain that this is a good habit when boarding any unfamiliar boat as crew.

☞ **INSTRUCTORS TAKE NOTE...**
How the students initially handle themselves on the boat can give you clues as to their comfort levels and physical coordination.

Sailboats are the same but different. The boat itself may be bigger and more elaborate than the boats the students learned on. They may not immediately see the basic elements they have learned in the unfamiliar configuration of the deck layout. For example, the halyards may lead aft along with every other line passing through a cluster of line stoppers.

TEACHING TIP...
Label lines at mast and/or at line stoppers. Save memory tests for later. If things are not labeled have students write names on tape and affix.

Key Points to Emphasize:

- You should point out the similarities among most recreational sailboats to familiarize the group to the new layout.
- Travellers, reefing lines, and alternate sheet leads can be introduced once the students have mastered the basics.
- Show students or ask them to show you safe places to sit and good positions for using the winches and other gear. Similarly, identify places *not* to stand or sit.
- Point out how the boat is secured to help them remember how to tie up upon returning to its mooring or slip.
- Show the location of the engine controls and engine panel.
- Open stowage lockers, and describe contents. Specifically mention location of overboard recovery gear, PFD's, and similar safety equipment.
- Go below and show students where to stow personal gear.

TEACHING TIP...
Other boats nearby may serve as good comparisons for similarities and differences.

INSTRUCTORS TAKE NOTE...
Remind students of safety concerns by pointing out hand holds and potential hazards such as lack of a toe rail.

TEACHING TIP...
For reference, have a plastic laminated illustration of the profile view of your particular boat, including underbody and sail plan, to be able to point out details of the rig, keel, prop and rudder. The reverse side could be an interior accommodation plan on which has been marked through-hulls, pumps, and fire extinguishers.

SYSTEMS OVERVIEW AND DAILY CHECKS

The introduction of systems on cruising boats is a big difference from the Basic Keelboat course. Some students may find this boring or claim that they are not mechanically inclined. You should teach them that familiarity and maintenance of systems is an essential part of cruising.

The comforts and conveniences on cruising boat come at a price of periodic inspections and the basic comprehension of the systems. Most sailors want to be able to make a harbor even if the wind has died. Most sailors like cold drinks and hot showers. Bareboat Cruising will go into more detail, but this is the time to get the students thinking about how to appreciate the systems on a boat.

Automobile driving schools rarely spent time showing a student how to check the oil or change tires, but boats are different from cars. If a car is disabled, you can walk away and call a tow truck. On a boat, catching a bilge leak can be the difference between a pleasant weekend sail and a frightful experience. In the long run, there is more peace of mind keeping track of the condition of systems and knowing what to do in an emergency. The watchfulness and prompt attention also reduce the chance of problems snowballing to the scale of expensive refits. Example: A small deck leak can cause serious electrical corrosion or fire.

It is good practice to have all switches and valves clearly marked.

TEACHING TIPS...

Try to feed the information in small discreet doses rather than overwhelm students with an hour lecture on engines, batteries, and plumbing while they are aware that on deck the sun is shining and the breeze is blowing. For example:

- The engine check and explanation of the use of the head are important before getting underway.
- The other important topics can be addressed at other times during the course. The electrical system explanation could lead into the use of the VHF. Managing a freshwater system could be explained when anchored for lunch.

ENGINE

KEY CONCEPTS TO TEACH

- Inspection and checks
- Procedures for starting and shutting down

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check engine systems: controls, fluids, ventilation, and cooling
- Operation of engine and its controls

KNOWLEDGE SKILLS:

- Proper fueling procedure and potential hazards
- Determining "blocked" cooling system

Inboard engines on sailboats are called auxiliaries. To modern cruising sailors they seem to provide essential rather than auxiliary power. Some sailors never learn to bring a boat in under sail or use dock lines effectively in the belief that the boat can always be muscled about under power. They can sometimes find themselves in awkward positions.

Nowadays, almost all auxiliary sailboats have diesel engines. Diesels are safer on boats because the fuel fumes are not explosive. Gasoline fumes can collect in the bilge or engine compartment and can be ignited by starting the engine or activating an electric bilge pump.

Essential Ingredients

Diesel engines will generally run if given:

- Warm ambient air temperature (not much concern in weather favored by most recreational sailors)
- A charged starting battery -- checked by voltmeter
- Clean fuel -- by keeping tanks and filters clean
- Oil -- clean, recommended oil up to proper level on dip stick
- Coolant and cooling water -- proper mix

TEACHING TIP...
A good technique where there is limited visibility for all students to observe at the same time -- such as the engine compartment or head -- is to first explain the points to one student and ask that student to explain them to the next one. This method checks comprehension, and a person is apt to pay more attention if he or she is going to have to explain it.

- Fresh air supply -- open vents and clean filters

Therefore these are the elements to keep watch on.

Adequate fresh air is important. Engine compartments on sailboats are often confined and almost sealed from the cabin with insulation to reduce noise. The large amount of air needed for a diesel to run properly must come from vents on deck that should not be obstructed. Black exhaust can be a symptom of insufficient air to the engine or a fouled air filter.

Diesel engines rely on compression to heat and ignite a mixture of air and fuel. (There are no spark plugs.) Commonly, glow plugs are set within the combustion chamber to raise the temperature and make starting faster and smoother. Length of preheat increases as engine temperature decreases. The engine instruction manual should give specifics.

In lieu of long discussions on engines, stress the importance of the manufacturer's manuals for full descriptions, maintenance schedules, and trouble-shooting. Mention the prudence and time savings of having the recommended spare parts on board even if a sailor must hire a mechanic to diagnose a problem and replace a part like a water pump impeller.

Inspection

Open up the engine compartment as much as possible. Point out that sometimes access is not very good.

Identify and demonstrate:

- Oil dip stick and how to read *(daily check).*
- Oil fill (which may need a funnel for awkward installations).
- Coolant expansion tank and proper level or check header tank -- but not when hot *(daily check).*
- Primary fuel filter, especially if there is a clear bowl where water and contaminants can be seen.

> ☞ **INSTRUCTORS TAKE NOTE...**
> In the past, shaft stuffing boxes have been a common source of bilge water but modern equipment is much improved. No drips should be seen when shaft is still, but when propeller shaft is rotating, older style stuffing boxes need to drip a few times a minute to keep the shaft and packing lubricated and cool.

- Raw water intake, seacock and strainer. Does the seacock open and shut easily? Is the strainer free of weeds and debris?
- Check for water drips and oil leaks.
- Check for loose belts (more than 1/2 inch deflection).
- Location of transmission, and the way to check fluid level.
- See whether shaft seal is dripping.
- Fuel tanks' valves and gauges.

✓ HOT TIP FOR YOUR STUDENTS...

A laminated card or posted checklist is a good reminder for novices. They could make up their own or the checklist could be part of each student's package of material.

Starting the Engine

Refer to the manual on an unfamiliar engine, but there are some common things to check:

- Open intake seacock.
- Battery switch must be set properly, and the DC main and/or ignition switches on the electrical distribution panel must be on; otherwise the engine won't turn over.
- The engine stop control ("kill lever," choke) must be set for operating the engine (not stopping it); otherwise the engine won't catch even though it is turning over.
- The transmission should be out of gear and the throttle opened slightly.
- Preheat and start. If engine doesn't catch quickly, double check level of fuel in the tank being used and that proper fuel line valves are open. When fuel delivery seems to be all right, preheat longer and try again. Try more throttle and crank longer. If cranking is slow, stop and check the battery voltage.
- After engine catches, slow throttle, check oil pressure on the engine panel gauge and verify the flow of raw cooling water by making sure that there is water gushing from the exhaust.

✓ HOT TIP FOR YOUR STUDENTS...

More than one person on any boat should know how to start the engine. This precaution is complicated because engine control systems are different from boat to boat. Clear labels and a quick reference instruction card make the process easier in an emergency. The card should include:

- The location and use of switches, panels, throttle control, and engine stop
- The combination of switches, keys, and buttons for the starting battery, ignition, and battery charging.

- Explain use of engine alarms for water temperature and oil pressure. But also advise checking the gauges at regular intervals whenever engine is running.

Shutting Down the Engine

Throttle back and pull engine stop lever until engine dies. Push lever back in and turn off the key (or the ignition switch). Note: If the engine is turbocharged and has been running hard, it should be idled for several minutes to allow the turbo unit to cool.

Under sail, you may put the gear shift in reverse (not forward) to stop the prop freewheeling to reduce wear on the stuffing box and drag while sailing, and to stop the whirring noise of a spinning shaft. (On some boats, the manufacturer's literature advises against putting the boat in gear with the engine stopped.)

MARINE SANITATION DEVICES (MSD)

KEY CONCEPTS TO TEACH

- Inspection and checks: marine toilet, holding tank, valves, seacocks
- Proper operation
- Awareness of regulations

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check the head systems
- Operation of the head

Marine sanitation device (MSD) is the term for the whole head system including raw-water intake, toilet, holding tank and/or treatment device, and exhaust line along with accompanying pumps, seacocks, and vented loops to control water flow and prevent flooding. The traditional use of buckets may mean less maintenance, but these days, civility and concern for water quality have resulted in elaborate plumbing.

Operation

Most cruising boats have manually operated heads which are described here. Some larger boats have electrical operation.

Standard Procedure

1) The raw water intake seacock must be open, and the valves properly set for the holding tank (unless boat is three miles offshore in the ocean, where overboard discharge is permitted).
2) Start with a few inches of water in the bowl.
3) To flush, open raw water intake with either a foot valve or a hand valve on the pump assembly.
4) Pump the handle. If there is much resistance, stop and check seacocks and valves. Most heads have double action

✓ **HOT TIP FOR YOUR STUDENTS...**
Heads are not trash disposals, and they are easily blocked by foreign material like paper towels, cigarette butts, or tampons. *Other than a small amount of toilet paper and recommended cleaning solutions, nothing should go in the head unless it has been swallowed first.*

pumps which pull rinse water into the bowl as it flushes the contents.

5) Pump until both the bowl and the exhaust line is clear of effluent, which may take 20 to 30 strokes.

Monitor the holding tank capacity and use pumpout facilities at marinas and docks regularly.

It is wise to close the seacocks when the boat is left unattended for any length of time, and if there is no vented loop, while sailing.

> ✓ **HOT TIP FOR YOUR STUDENTS...**
> Don't assume vented loops on today's boats. Seacocks may need to be closed when underway.

ELECTRICAL

KEY CONCEPTS TO TEACH

- Inspection and checks
- Use of the main battery switch

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check electrical system: batteries, fluids, and main battery switch

Most cruising boats in the U.S. run on 12-volt DC systems with batteries charged by engine-mounted alternators or by separate generators. Shore power is 115 volts AC and 60 Hertz (Hz = cycles per second), and some boats have inverters which change DC to AC, and converters which change AC to DC. One example of a converter is a battery charger.

There are numerous ways all of this may be accomplished and nothing should be taken for granted. Builders literature, wiring diagrams and documentation of modifications are the only good way to keep track of it all.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Make your students aware that some European-built sailboats run on 24-volt DC, and occasionally a 32-volt system may be found. Shore power in Europe is 115 volts, but at 50 Hz, which can do irreparable harm to U.S. electrical equipment.

For the purposes of the basic cruiser, a simple introduction will suffice.

Key Points to Emphasize:

- Electricity is needed for starting the engine and for lights, electronic instruments, and other modern conveniences.
- An engine will start best using a fully charged battery -- one that is not drawn down by cabin lights and stereo use. It is wise to have a separate battery for starting the engine.
- Other "house" batteries may be wired together to increase the total amount of amperage available for "house use."

- Battery switches are used to isolate or combine batteries for versatility, such as starting the engine off the house battery if the engine battery is low. But in normal use, the engine starting battery and the house batteries should be isolated for their separate uses and be able to be charged at the same time without turning switches.
- *Warning:* On many boats, the alternator will be ruined if the battery switch is turned off or to another position while the engine is running. (An alternator should not be used to charge "dead" batteries.)

FRESH WATER

KEY CONCEPTS TO TEACH

- Inspection and checks
- Filling tanks
- Water conservation
- Sumps

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check fresh water system: quantity, valves, and pumps
- Operation of equipment

Boats carry a small supply of fresh water -- typically 30 to 50 gallons, sometimes less. Fresh water is used for drinking, cooking, and washing, and must be allocated accordingly.

Filling Water Tanks

Make sure water is potable and tastes all right before filling tanks. Check valve settings for tanks before and after filling, and make sure the deck fill plate is securely tightened when finished to prevent contamination from sea water or deck washing.

☑ **HEADS-UP PRECAUTION FOR STUDENTS...**
Check that fill is for water, not fuel or waste.

Water Conservation

Water conservation should become first and second nature to a cruising sailor -- mostly because it is often a time-consuming nuisance to go to a dock to fill the tanks, and because it is a real nuisance to run out of water in a remote setting.

Key Points to Emphasize:

- *Don't let taps run.*
- Fill a basin to wash your face.
- Use a cup of water for brushing your teeth.
- Wipe food and grease from dishes thoroughly before washing so that a small amount of soap goes a long way and makes rinsing easier.
- Use separate basins or bowls for soapy water and rinse water.

It is best if a boat has two or more smaller water tanks that can be isolated from each other rather than one big one. If a leak develops in one tank or its plumbing, the whole water supply will not end up in the bilge.

A pressure water system will empty a tank quickly if a leak is on the tap side of the pump. Listen for the sound of the pump cycling. If the pump activity is not tied to water use, investigate. If a tank is empty, a pump will run constantly and burn out.

The simplest way to conserve water is to **turn off the pressure water system**. The crew will use less water if they have to use the manual pump.

Sumps

Shower drains are below the waterline and must drain into a sump that can be emptied over the side by a sump pump. Sumps need to be cleaned occasionally to prevent hair and other debris from clogging the outlet. Make your students aware of the possibility that some boats may be built with the shower draining into the bilge, but most designers and builders rightly prefer to keep gray water and soap scum out of the bilge.

TEACHING TIP...
Ask your students how many manual and electric pumps are on a boat?
Answer:
- Engine: raw-water pump, oil pump, fuel lift pump
- Fresh water: manual sink pumps, pressure water pump(s)
- Drainage pumps: shower/sink sump pumps, refrigeration/icebox pumpout
- Head pump
- Bilge pumps: electric, manual deck, high volume gusher type
- Alcohol stove
- Hydraulics

BILGE CONCERNS

KEY CONCEPTS TO TEACH

- Inspection and checks
- Bilge sump, intakes, manual and electric pumps
- Awareness of potential problem leaks

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check bilge system: pumps, intakes, alarms
- Operation of pumps

The bilge is the area below the cabin sole. Explain to your students that cruising boats may have a **bilge sump** to collect water entering the bilge and keep it from sloshing around behind the joinerwork or furniture when heeled over. It is also a logical place to locate the intake for bilge pumps. If your boat has a sump, point it out to your students, including any intakes. Note that boats with flat bottoms and narrow fin keels often have no space for a sump.

Water in the Bilge

Key Points to Emphasize:

- The bilge should be visually checked regularly.
- If water is found that does not have an explainable source (rain water coming down the mast, icebox drainage or a known drip in the stuffing box), a competent crew should track down the problem before it becomes a serious one.
- Seacocks close off the source of the water, but it is important to know what the particular through-hull fitting is servicing. Labels and a through-hull diagram help. Each through-hull fitting should have a soft wood plug on a lanyard next to it to force into the hole if the seacock fails.

☞ **INSTRUCTORS TAKE NOTE...**

Sources of potential problem leaks include:

- Pipes, hoses, and through-hull fittings can crack.
- Keel bolts can leak. Usually due to age and corrosion, but also as the result of a hard grounding.
- Deck fittings and hull-deck joints can develop leaks. These range from minor to severe both in significance and repair.

Remind your students that the contents of water tanks cannot sink the boat, although the floorboards might float.

> ✓ **HOT TIP FOR SALT-WATER SAILORS...**
> To determine whether the bilge water is coming from a seawater or freshwater (rain or water tanks) leak, taste it.

Bilge Pumps

By law, cruising boats must have manual bilge pumps operated from on deck. In addition, electric pumps are convenient, and prudent sailors install high capacity manual pumps for emergencies.

> ☑ **HEADS-UP TIP FOR YOUR STUDENTS...**
> An electric bilge pump set on "auto" may hide a problem until the pump runs the battery flat while the boat is unattended.

The size of the pump is not proportional to the size of the vessel. A two-inch hole two feet underwater lets in the same amount of water on a 24-footer as on a 60-footer; only the 24-footer has much less volume to fill before losing buoyancy (i.e., sinking).

Bilge pump intakes can clog with debris which is usually wood shavings and bits of hardware deposited during building or bits of paper or cloth that get lost behind drawer or lockers and fall under the sole. The debris can damage pumps and clog limber holes preventing water from flowing freely to the bilge sump. The pump intake strainer should be checked occasionally, and foreign objects should be removed from the bilge.

🕮 ADDITIONAL SOURCES OF INFORMATION

Boatowner's Mechanical and Electrical Manual by Nigel Calder
The Annapolis Book of Seamanship by John Rousmaniere
Steve Colgate on Cruising by Steve Colgate

LEAVING THE DOCK

KEY CONCEPTS TO TEACH

- Wheel steering considerations
- Departure techniques under power

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Departure under power (helmsman/crew coordination and skills)
- Use of docklines
- Stowage of docklines and fenders

KNOWLEDGE SKILLS:

- Use of a float plan
- Effects of wind, tide and currents
- Departure under power in upwind, crosswind and downwind situations

Refer to the Basic Keelboat Instructor manual pages 1-80 to 1-82 to review leaving a dock under sail. If a sailor has learned to leave and return to a dock under sail, maneuvering under power comes more easily.

See "Maneuvering under Power" in this Basic Cruising section for specifics on maneuvering under power.

Cruising boats do provide challenges:

- The hulls have more mass and windage and can be harder to control by hand.
- Repair costs can be bigger if there is an accident.
- Because they have engines, they tend to be docked in tight spaces.
- Wheel steering does not give the same sense of feel and rudder angle that a tiller does.

Steering

If your cruising boat has a wheel, steering with a wheel rather than tiller may seem more natural to students, but they need to learn how much helm is necessary for the desired reaction of the boat.

Demonstrate the full number of turns stop-to-stop and explain that the rudder is centered halfway between. The king's spoke (the spoke of the wheel that is uppermost when the rudder is centered) should be marked with tape or some other method for reference. You may also show the students the quadrant as a way of centering the rudder.

☞ INSTRUCTORS TAKE NOTE...
Remind students that boats have no steerage when stopped (like a parked car) and poor steerage at slow speed.

Leaving a Dock or Slip

Departure has less to do with steering than with prevailing conditions and proper line handling.

✎ TEACHING TIP...
Review names of lines: bow, after spring, breast, forward spring, stern.

Departure Considerations -- Key Points to Emphasize:

- Assess wind direction and current. If the lines were released, where would the boat go?
- Decide on preferred maneuver for the conditions, the amount of room, and the abilities of the crew available.
- Take into account the effect of mass and weight on maneuvering
- Consider alternatives in case first plan has a problem. Returning to the space or slip can be a good alternative.
- Explain what you have in mind and what each person should do (assign crew members to fend off and handle docklines and fenders). Include the alternatives.
- Remind inexperienced crew members to use fenders -- not hands and feet -- to fend off.
- Check for traffic. Can your maneuver be accomplished without interruption?

Basic Use of Single Spring Lines -- Key Points to Emphasize:

In light to moderate conditions with the helm centered:

- An *aft spring* from the bow with *forward engine* thrust (some boats will respond better with the rudder turned toward the dock) will kick the *stern out* from the dock. A fender will be needed at the bow as it comes into the dock.
- A *forward spring* line from the stern and *reverse* thrust will push the *bow out* slightly. A fender will be needed at the stern.
- A *forward spring* line from the stern to a cleat at the end of a dock and the boat in reverse will pivot the boat's stern around and swing the bow to right angles with the dock.
- An *aft spring* from amidships (or just aft of amidships) with forward thrust will hold the boat against the dock.

Before releasing all the lines, have the students take note of how the boat is tied up for the return later.

☞ **INSTRUCTORS TAKE NOTE...**

Many boats have short lengths of dock lines only for securing a boat in its customary space. A useful spring line for maneuvering should be six to ten feet longer than the boat so that the line can be doubled back to the boat around a dock cleat or bitt and slipped free when the boat is turned in the right direction.

✓ **SAFETY TIP FOR YOUR STUDENTS...**

Make your students aware of the hazards of lines in the water while under power.

CREW WORK AND SAFE OPERATION ON A LARGER BOAT

KEY CONCEPTS TO TEACH

- Helmsman/crew coordination and skills on a larger boat

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Use of winches
- Clearing a fouled winch
- Knots
- Heaving a line
- Use of sail controls
- Close-quarters maneuvering under sail
- Steering compass courses
- Helm and boat control

KNOWLEDGE SKILLS:

- Crew responsibilities and communications
- Real and apparent wind
- Advantages of working to weather
- Lightning protection

The Basic Keelboat Instructor manual (pages 1-44 to 1-79) cover sailing techniques well. In the BC course the students have an opportunity to practice and perhaps adapt what they have learned to a different boat. You are providing guidance away from miscomprehensions as well as reinforcement of the skills they are trying to master.

You should warn the students that:

- The working loads on the gear are greater, even though it may not appear that way when everything is secured.
- Bigger boats have slower acceleration, larger turning circles, and longer glides.
- There may be less sense of speed on a bigger boat where the crew are higher above the water.
- Boats are easy to oversteer. The objective is to use as little helm as possible.

TEACHING TIP...
Review proper line handling and winch operation, including the procedure for clearing a fouled winch.

- When raising the main, remind students to look aloft for clear hoisting.
- When setting sail, be sure to explain the use of gear uncommon on smaller boats, such as main boom toppinglift, hydraulic vang, and roller furling.

Crew Work

Simply stated, when boat changes direction or the wind changes, sails need adjusting, and if one person doesn't want to do everything, the crew needs to communicate to perform effectively as a team.

Sailors should always be attentive to what is going on. Good crews often avoid mistakes and problems by thinking through a maneuver and looking over the boat to see that things will run smoothly.

Helmsman responsible for clear room to tack, traffic, etc.
Sail trimmers responsible for clear jib sheet.

The important points in determining working positions:

- The helmsman needs to see forward and see the instruments.
- The sail trimmers need comfortable room to tail and grind a winch and the jib trimmer needs to see how the genoa looks against the spreader.
- Everyone needs to understand what will happen where and when.
- Everyone on deck should keep a lookout for other boats approaching.

Tacking and Jibing Practice

- Have the helmsman practice steering toward a landmark and occasionally glance at the compass to confirm the course.
- Before tacking or jibing, the helmsman should try to pick a new landmark and compass heading for the new tack.

✓ **HOT TIP FOR YOUR STUDENTS...**
Crew members double checking each other is good teamwork, not a lack of trust. For example, check that sheets will clear hatches.

TEACHING TIP...
Inexperienced helmsman may tend to fixate on the compass. Get them to watch boat's heading on horizon.

✓ **HOT TIP FOR SAIL TRIMMERS...**
After tacking and trimming in the jib, prepare for the next tack:
- ✓ Coil the jib sheet and set down so it will feed out freely off the top on the next tack.
- ✓ Overhaul the lazy jib sheet and put two loose wraps on the windward jib winch.

- The helmsman asks if everyone is ready, and each crew should say "ready" before the helmsman says "hard a-lee" (or "tacking") and puts the wheel over.
- Let the crew compare fast tacks and slow tacks to see at what speed the jib is easiest to trim and the boat carrying its way best.
- Demonstrate that smaller jibs are easier to trim.

Knot Tying Practice and Line Throwing

Refer to the Basic Keelboat Instructor manual (pages 1-105 to 1-108).

Have students review and practice the basic knots (stopper knot, bowline, cleat hitch, sail lashing knot) and have students check each other.

Add two half hitches, clove hitch, sheet bend, and rolling hitch to the repertoire. Point out that the rolling hitch is good for taking strain off a line or adjusting tension on tie-down for an awning, etc.

✓ **HOT TIP FOR YOUR STUDENTS...**
When throwing a dock line to a person, it is better to aim next to catcher rather than at him or her. A line can knock someone's glasses off or simply catch them by surprise.

INSTRUCTORS TAKE NOTE...
Caution students about lines in the water and propellers in gear.

ACTIVITIES

- Students practice with lines while doing under-power maneuvers. Example: Instruct the helmsman to stop the boat 10 feet from buoy, and have another student tie a bowline in a dock line and try to hit the buoy with the thrown line.

SHORTENING SAIL

KEY CONCEPTS TO TEACH

- Shortening sail before getting overpowered
- Shortening sail techniques

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Reefing techniques
- Helm and boat control under shortened sail

KNOWLEDGE SKILLS:

- Sailboat dynamics: CE, CLR, lee and weather helm
- When to reef

Shortening sail is basic to sailing. Far too many sailors consider reefing an emergency procedure.

Key Points to Emphasize:

- A reefed main or a small jib is simply a way of reducing sail power which can be done for the ease of the crew and to reduce heel.
- Sailboats generally perform better with less heel. Dragging the rail in the water and fighting the wheel may feel powerful, but the power is going into heeling the boat over and creating drag with the rudder.
- The objective of a good sailor is to maintain balance and control of the boat.

✓ **TEACHING TIP...**
In a good breeze, have your students determine whether the boat goes faster with the rail in the water and overpowered or reefed and sailing upright.

Reducing Sail Area

When to Reef or Reduce Sail (Area) -- Sail area should be reduced to prevent a boat from getting overpowered, and there are usually three signals indicating this condition:

✓ **SEAMANSHIP TIP FOR YOUR STUDENTS...**
It is always better to shorten sail in advance than waiting until the boat gets overpowered.

- Boat is heeling too much.
- Boat has too much weather helm.
- Sails have previously been depowered to reduce heeling and weather helm.

?? DECISION MAKING QUESTION...
Ask your students when a boat is overpowered
Answer:
- When the rail is starting to drag in the water.
- When there is too much weather helm.

Options for Reducing Sail

The options for a boat with no reefing capability is usually limited to dropping the mainsail or jib, or changing to a smaller jib, while a boat which can reef the mainsail, and in some cases the jib, expands the options. Which option to use will depend on the type of boat, the wind and sea conditions, and the point of sail.

Sailing to Windward. An option is needed that will not only reduce heeling, but also will allow a small amount of weather helm so the boat will have a tendency to head up rather than down when a puff hits. A reefed mainsail can often be used without a jib, and another option is a combination of a reefed mainsail and a small jib. For boats with no reefing system, a luff would have to be carried in the mainsail as a way of reducing effective sail area, but as wind and sea conditions increase, a point is reached where the mainsail would have to be lowered and the boat sailed under jib power.

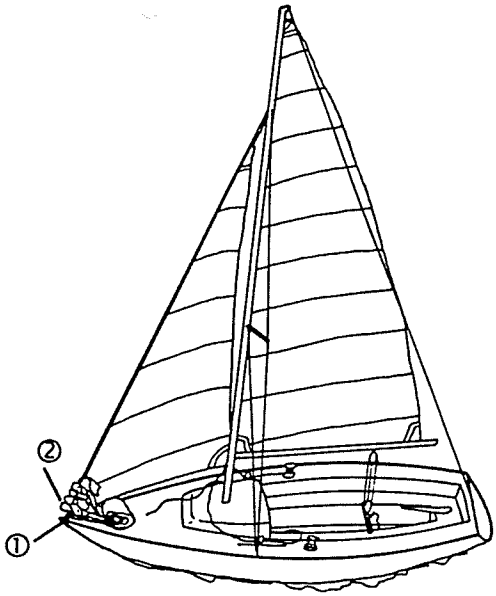
Sailing Downwind. The mainsail can be dropped and a small jib can be used. Sailing under jib alone will help resist the tendency to round up (turn into the wind) when the boat rolls. Explain to your students the importance of making sure the mast is adequately supported in this condition. Under extreme conditions, sailing under bare poles with no sails is another option, if there is enough sea room to leeward.

Changing a Jib

Standard Procedure (with Hanks/Clips)

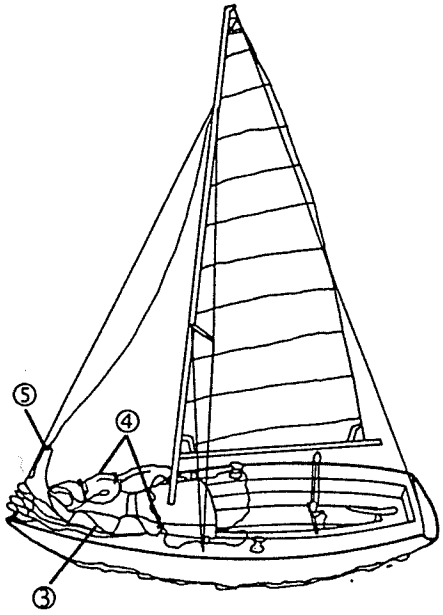
Concept: Attach the tack first, then the luff starting from the bottom, the sheets, and when other jib is lowered, attach the halyard.

1) Bring folded sail to forestay and attach tack to bow fitting.
2) Attach luff to forestay starting with the bottom fastener and working up to the head (the first couple of fasteners of the raised jib may have to be removed to allow enough room).
3) Unfold sail.
4) Lower the jib, remove it and change sheets to new jib.
5) Attach the jib halyard to the new jib.
6) Hoist the new jib.



Notes:

1) If the boat has a spare jib halyard, it can be attached to the new jib.
2) For jibs with tape luffs instead of fasteners, step 2 is eliminated.
3) If boat has a double headstay groove for two luff tapes, raise new jib on windward side of existing headsail, attach lazy sheet as new working sheet, lower the old sail and change the other sheet.



Reefing a Jib

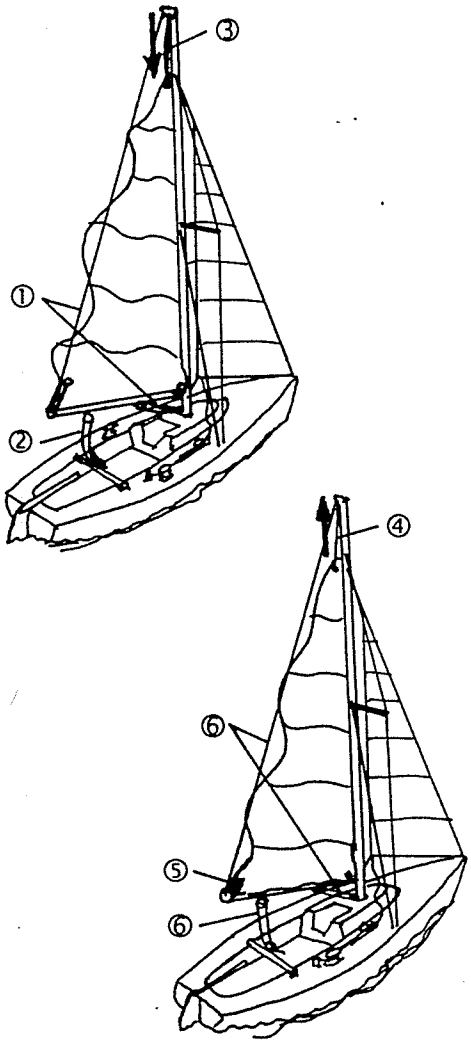
Roller Furler. Jib is reefed by rolling up the amount of sail needed to balance the boat. To work effectively, jib should be designed and made so it can be reefed. After reefing the jib leads may have to be moved.

"Jiffy" Reefing. Similar to the mainsail system. Jib has luff and leech reefing cringles. The luff cringle is passed over a hook on the tack fitting or lashed to the tack, and the leech cringle is lashed to the clew with a short length of line.

✓ **HOT TIP FOR YOUR STUDENTS...**
With a double grooved headstay, raise the new sail on the windward side, then tack; lower the old sail on the windward side.

Reefing a Mainsail

The standard procedure uses the "slab" or "jiffy" reefing system since most boats are set up for it.



Standard Procedure for Reefing

Concept: Lower the sail just enough to reef the luff, rehoist it, then tighten the leech reefing line.

1) Ease vang and tension toppinglift (or adjust hydraulic vang).
2) Ease sheet as needed throughout procedure.
3) Ease halyard until luff cringle can be passed over hook/horn on the boom.
4) Tension halyard.
5) Haul in reefing line (pennant) until leech cringle is tight on the boom (line also serves as an outhaul for the reefed sail).
6) Trim sheet, ease toppinglift, and adjust vang.
7) Add safety line through leech cringle.
8) Loose sail may be secured loosely with lashings or a line through reefing eyes using a *reef knot.*

Notes:

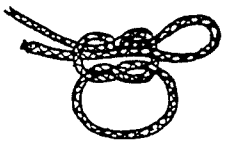
1) Some people prefer to ease the sheet and vang before taking up on the toppinglift, to make it easier to tighten the leech reefing line. The disadvantage is that the sail luffs a little longer. Which alternative to use depends on how difficult it is to tighten the line and how important it is to keep the boat moving.
2) Determine most efficient sequence for your boat.

✓ **HOT TIP FOR YOUR STUDENTS...**
Reference marks on the main halyard indicating reefing positions (i.e., 1st, 2nd reefs) will facilitate steps 3 and 4.

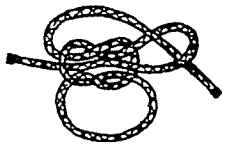
☞ **INSTRUCTORS TAKE NOTE...**
1) Warn students about the hazard of a swinging boom, especially in rough conditions.
2) Point out that reefing should not be done while on a broad reach or run.

Tying a Reef Knot

1) Tie a square knot with a loop.



2) Pass other end of line through loop.



3) Take slack out of loop

Standard Procedure for Taking (Shaking) Out a Reef

Concept: Release leech reefing line, lower sail to unhook the luff, then rehoist sail.

1) Release sail lashings and leech safety line (if sail has been secured with lashings or a line).
2) Ease vang and adjust toppinglift (or adjust hydraulic vang).
3) Ease sheet.
4) Release reefing line (pennant) completely.
5) Ease halyard until luff cringle can be removed from hook/horn on the boom.
6) Tension halyard.
7) Trim sheet, ease toppinglift, and adjust vang.

Reducing Sail Power

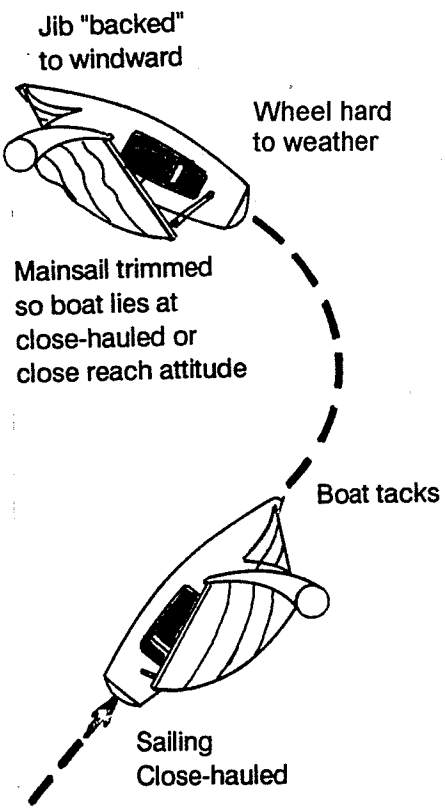
Heaving-To -- Is a method of almost stopping a boat under sail. The boat minds itself and lets the crew rest, check navigation, or tend to something that needs immediate attention. Most people only think of a boat hove-to in a storm, but it can also be a pleasant way to stop for lunch in open water (or conduct a sailing lesson). As always, someone should keep a lookout.

The sails and helm are adjusted so that as the boat picks up speed, it will head up into the wind and slow. As it slows the bow will fall off, and the boat will pick up a little bit of speed and start to head up. The boat gains in distance traveled about what it loses in leeway.

The Set-Up:

- For heaving-to in fair weather, a small jib (100%) is backed (sheeted to weather) by tacking and not releasing the jib sheet.
- The mainsail or reefed mainsail is sheeted in.
- The wheel is turned hard over to weather and secured.

Boat Hove-To



How It Works:

The mainsail provides drive to get the boat moving, but when water flows over the rudder the helm steers up into the wind and the boat slows, but before the boat goes into irons, the backed jib forces the bow off and the boat picks up speed again, repeating the cycle. The boat jogs along changing course with a changing apparent wind angle of 30° to 50°. Different boats find this balance with different sail configurations at different wind speeds. Experiment.

🕮 ADDITIONAL SOURCES OF INFORMATION

The Annapolis Book of Seamanship by John Rousmaniere
Colgate's Basic Sailing by Steve Colgate
Steve Colgate on Cruising by Steve Colgate
Easy on the Helm: Boat Handling under Sail and Power by Tom Cunliffe

ACTIVITIES

- Students practice putting in a reef and taking one out on a mainsail.
- Students practice changing headsails (if applicable).

BASIC PILOTING

KEY CONCEPTS TO TEACH

- Chart reading and orientation
- Basic dead reckoning
- Navigation Rules while under power

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Chart symbols and visual observations
- Plotting course and position
- Calculating time/speed/distance
- Taking bearings and fixes
- Plotting danger bearings

KNOWLEDGE SKILLS:

- Magnetic influences on compass
- True and magnetic compass readings
- Application of variation and deviation
- Know Navigation Rules 4-10 (steering and sailing)
- Know how to access Navigation Rules 20-31 (dayshapes) and 32-38 (sound signals)

At this point of instruction, the purpose of piloting and navigation is to keep students out of immediate trouble and to develop awareness of changing circumstances around the boat.

The students should be encouraged to take a separate piloting course. Electronic instruments are not a substitute for good piloting techniques.

Review chart introduction in the Basic Keelboat Instructor manual, pages 1-119 to 1-123.

TEACHING TIPS...

- Have a chart or portion of a chart of the sailing area covered in plastic and mounted on a board that is a convenient size for the cockpit.
- Have "Chart 1" on board for anyone who wants to figure out symbols on the local chart.

Navigation Activities and Exercises

Position the boat near an identifiable location on the chart (perhaps next to a buoy) point out landmarks visible from the boat's cockpit and compare them to corresponding symbols on the chart.

- Spot aids to navigation and identify them on the chart.
- Have students sight the landmarks with a hand bearing compass. Show how the bearings that are at broad angles to each other cross at your position.
- Compare depth on the chart to the fathometer and/or leadline depth, and discuss why.
- Introduce the basics of course, speed, and distance. Get students to take note of the time the boat passes a buoy and when to expect being abeam of the next one.
- Compass steering should be introduced by comparing course steered to landmark with course on compass. New compass course can be figured out before tack or jibe.

TEACHING TIP...
Commercially available plastic 8" by 11" cards with aids to navigation and navigation rules are helpful learning or reference aids to have on board for your students.

Collision Avoidance

Review the Basic Keelboat Instructor manual, pages 1-85 to 1-88.

HANDLING EMERGENCIES AND OVERBOARD RECOVERY

KEY CONCEPTS TO TEACH

- Preparedness
- Prevention
- Techniques and plans of action

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Most appropriate overboard method (i.e., Quick Stop, Lifesling-type, Quick-Turn)
- Steering and boat control with sails (steering failure)

KNOWLEDGE SKILLS:

- Quick-Stop, Lifesling-type, and Quick-Return overboard recovery methods under sail
- Overboard recovery under power: when to do and inherent dangers
- Running aground recovery methods
- Emergency steering system and boat control
- Towing techniques
- Six distress or emergency signals

Review the Basic Keelboat Instructor manual on handling emergencies.

Sailing is a relatively safe activity, but occasionally things go wrong. Most emergencies give some opportunity to react, and with preparation and practice the severity of the problem can usually be minimized.

Key Points to Emphasize:

- A prepared crew can respond quickly and effectively and help themselves until outside help is available.
- When getting on an unfamiliar boat, always note the location of:
  - ☑ Overboard recovery equipment
  - ☑ PFDs
  - ☑ Bilge pumps
  - ☑ Fire extinguishers
  - ☑ Anchor and rode
  - ☑ Tool kit and sharp knife

Overboard Recovery

Prevention

Review some of the steps that can be taken to avoid falling overboard. Namely,

- Wear shoes with non-skid soles.
- Use "one hand for yourself and one for the boat."
- Keep low to avoid boom and maintain balance.
- Use a safety harness properly (if available) and clip on to strong points.
- Brief inexperienced guests/crew about the boat's "safe" and "danger" zones, the boom, moving carefully and holding on, wearing a life jacket, and overboard recovery procedures.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Practice and understanding of various methods should prepare students/instructors to make appropriate and automatic reaction to overboard conditions and required decisions.

Overboard Recovery Methods

There are several ways of recovering a person who has fallen overboard. Since this accident causes more deaths in boating than any other, US SAILING has coordinated significant research into this problem. Losing sight of the victim correlates very highly with loss of life.

The Quick-Stop Recovery Method. Described below was developed specifically to eliminate this element of the problem in large offshore boats. It is the preferred method, but may not be as suitable in small inshore keelboats whose stability characteristics may result in dramatic changes and loss of control during a jibe in heavy weather. Consequently, alternative methods which avoid a jibe may be preferable in these smaller boats.

The Lifesling-Type Recovery Method. If there are few people on board, the Lifesling-type recovery method should be employed. It takes longer than the Quick-Stop, but provides a means for a single crew member to effect a rescue of a victim in the water. Of course, a Lifesling can also be used after a Quick-Stop maneuver to assist in retrieving a victim from the water.

The Quick-Turn Recovery Method. This method is a suggested alternative for these smaller, more responsive boats which can execute this maneuver without losing sight of the victim. However, students who move into larger boats must be proficient in the Quick-Stop method to avoid the inevitable loss from sight of a victim in the water.

Practice is necessary with all overboard recovery methods, and students are expected to be completely competent in at least one method which is most appropriate for their sailing ability, boat type, crew experience, wind and sea conditions, and maintaining constant visual contact with the victim.

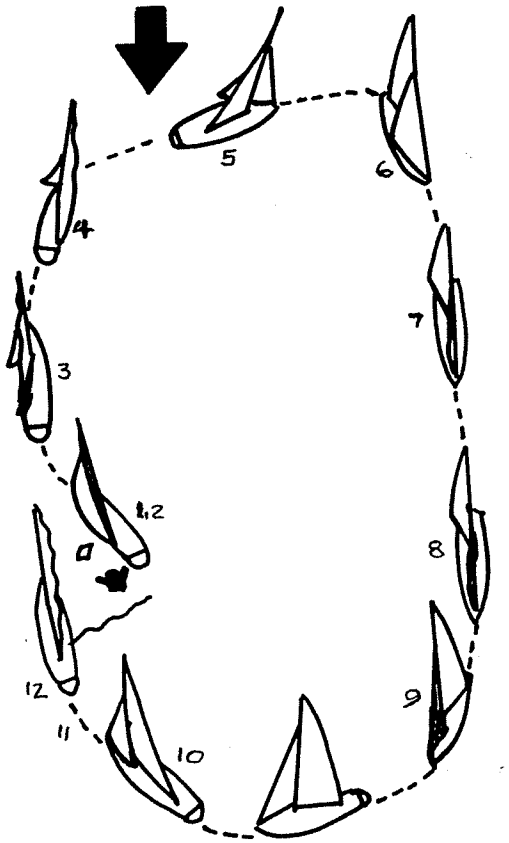
Recovery Considerations

- First action -- call "crew-overboard" (or more traditional hail, "man-overboard").
- Deploy everything that floats to aid victim and help spotter keep him/her in view.
- Put best person on helm, designate at least one person to watch person in water.
- Make students aware that the handling characteristics and maneuvering ability of a boat will vary depending on the boat, and the wind and sea conditions.
- If contact is missed on the first pass, drop overboard pole rig or life ring "on top" of person for his or her use and to mark the location.
- Establish contact using a line, life ring with line attached, Lifesling, or boat hook.
- When bringing person on board, the boat can be kept in position by pulling the boom forward with a preventer and putting the helm down, or heaving-to.
- Freeboard height can make it difficult to pull person aboard again. Use a ladder, or hoist victim with boom vang or halyard attached to harness/sling.

The Quick-Stop Overboard Recovery Method (for fully crewed boats)

US SAILING's Safety at Sea Committee, the U.S. Naval Academy Sailing Squadron, the Cruising Club of America's Technical Committee and the Sailing Foundation of Seattle, Washington joined forces to conduct extensive research and sea trials. The result of their collaboration was the "Quick-Stop" method of overboard recovery. The hallmark of this method is the immediate reduction of boat speed by turning in a direction to windward and thereafter maneuvering at modest speed, remaining near the victim. In most instances this is superior to the conventional procedure of reaching off, then either jibing or tacking and returning on a reciprocal course, since the victim is kept in sight throughout.

Standard Procedure for the Quick-Stop Recovery

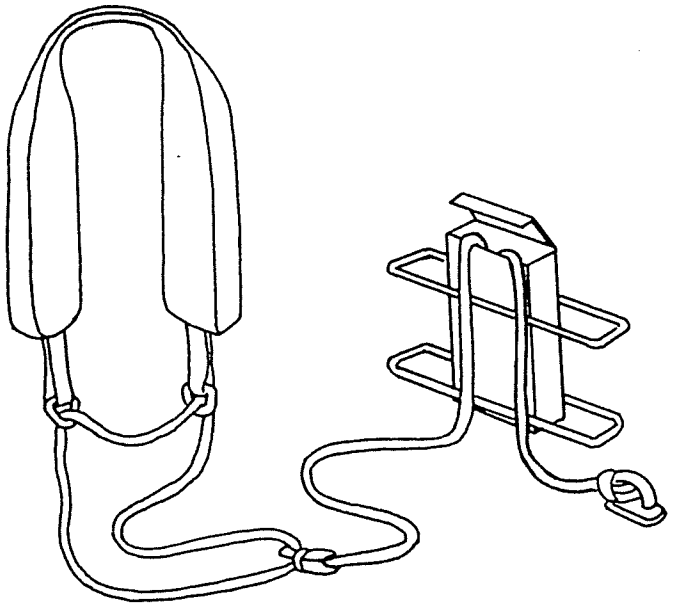


1) **Shout "crew-overboard"** (or the more traditional hail, "man-overboard") and, if available, designate a crew member to spot the person's position in the water. The spotter should not take his/her eyes off the person.
2) **Provide immediate flotation.** Deploy buoyant objects such as cockpit cushions, rolled up PFDs kept handy to the helmsman, life rings and so on. These objects may not only come to the aid of the person, but will "litter the water" where he/she went overboard and help the spotter to keep him/her in view. It was determined that deployment of the standard overboard pole rig required too much time. The pole rig is saved to "put on top" of the person in case the initial maneuver is unsuccessful.
3) **IMMEDIATELY bring boat head-to-wind** and beyond (if not close-hauled, trim main to close-hauled).
4) **Allow headsail** to back and further slow the boat.
5) **Continue to turn** with headsail backed until the wind is aft of the beam.
6) **Course is stabilized** on this beam-to-broad reach for two or three lengths then altered to nearly dead downwind.
7) **Drop the headsail** (if practical) while keeping the mainsail centered (or nearly so). The jib sheets are not slacked, even during the dousing maneuver, to keep them inside the lifelines.
8) **Hold the downwind course until** the person in the water is aft of the beam.
9) **Jibe** the boat.
10) **Approach the person** on a course of approximately 45 to 60 degrees off the wind (close reach).
11) **Establish contact** with the person with a heaving line or other device. A "throwing sock" containing 50 feet of light floating line and a kapok bag can be thrown into the wind because the line is kept inside the bag and trails out as it sails to the victim.
12) **Effect recovery** as conditions and equipment allow.

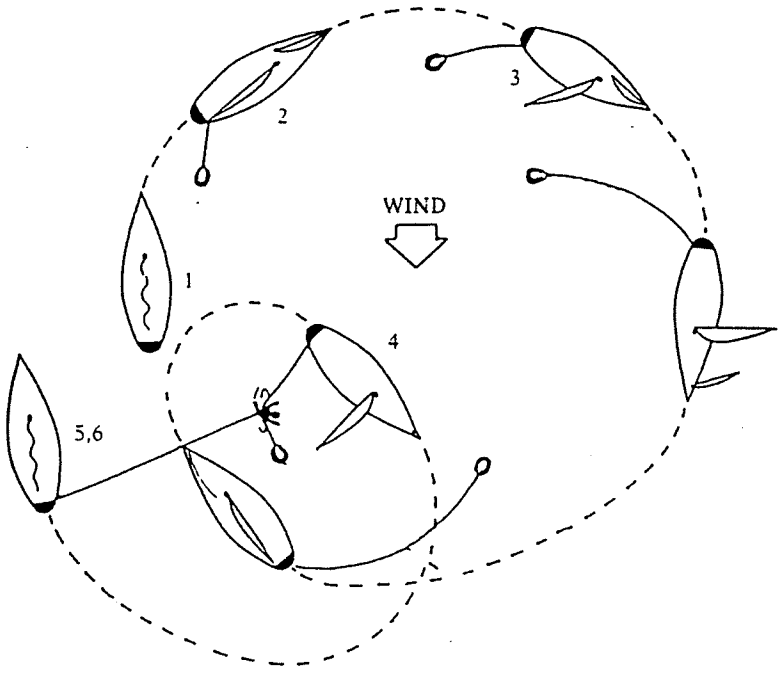
The use of the engine is not required or recommended unless there is insufficient wind to execute the maneuver.

The Lifesling-Type Overboard Recovery Method

The Lifesling. It is a floating horse-collar device that doubles as a hoisting sling, which can be used by a fully crewed or shorthanded boat to retrieve a victim in the water. It also addresses the difficulty of bringing a person back aboard, if the freeboard is too high or the victim has sustained injuries. The Lifesling is attached to the boat by a length of floating line up to 150 feet long.



Standard Procedure for the Lifesling-Type Recovery



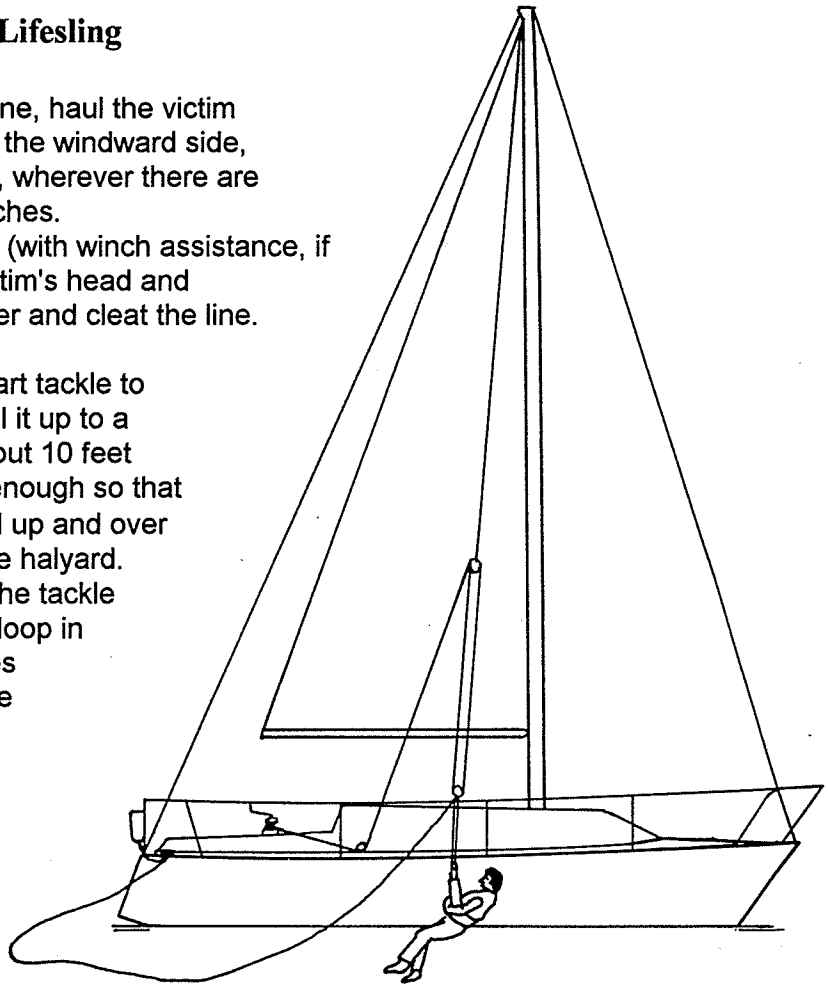
1) **Shout "crew-overboard"** and a cushion or other flotation is thrown while the boat is brought IMMEDIATELY head-to-wind, slowed and stopped. The main is trimmed to centerline.
2) **The Lifesling is deployed** by opening the bag that is hung on the stern pulpit and dropping the sling into the water. It will trail out astern and draw out the remaining line.
3) **Once deployed, the boat is sailed in a wide circle** around the victim with the line and sling trailing astern. The jib is not tended but allowed to back from the head-to-wind position, which increases the rate of turn.
4) **Contact is established** with the victim by the line and sling being drawn inward by the boat's circling motion. The victim then places the sling over his/her head and under his/her arms.
5) **Upon contact,** the boat is put head-to-wind again, the headsail is dropped to the deck and the main is doused.

6) **As the boat drifts slowly backward, the crew begins pulling the sling and the victim to the boat.** If necessary, a cockpit winch can be used to assist in this phase, which should continue until the victim is alongside and pulled up tightly until he/she is suspended in the sling (so that he/she will not drop out).

Note: This system is effective if: 1) line length is preadjusted to avoid running over the line, and 2) method is practiced to complete competence.

The Hoisting Rig for the Lifesling

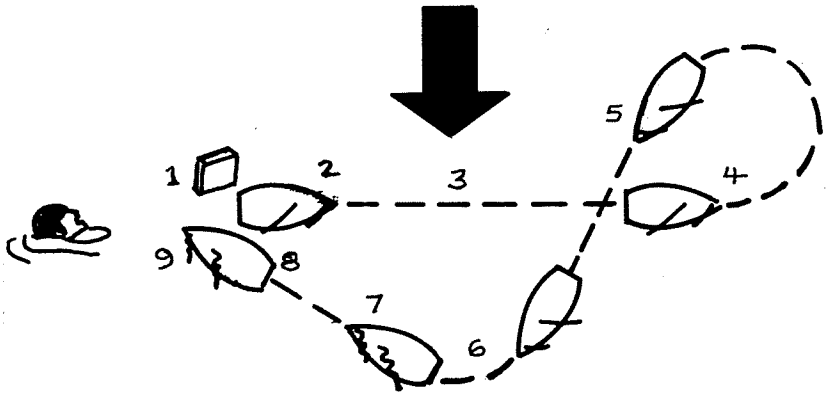
1) With the floating tether line, haul the victim alongside, preferably on the windward side, amidships to the quarter, wherever there are available cleats and winches.
2) Pull up on the tether line (with winch assistance, if necessary) to get the victim's head and shoulders out of the water and cleat the line. The victim is now safe.
3) Attach a three- or four-part tackle to the hoisting halyard, haul it up to a predetermined point, about 10 feet above the deck or high enough so that the victim can be hoisted up and over the lifelines. Cleat off the halyard.
4) Attach the lower end of the tackle to the (previously sized) loop in the tether line that passes through the D-rings of the sling.
5) Reeve the running end of the tackle through a sheet block or snatch block on deck and put it on a cockpit winch. Hoist the victim aboard by winching in on the running end of the tackle.



Notes: 1) The hoisting halyard may be a spinnaker halyard, if available, or a specially fitted hoisting halyard. On longer boats the main halyard is too high to be used. 2) The three- or four-part tackle is not necessary on boats with sufficiently powerful halyard winches. The procedure is greatly simplified using a single halyard to hoist with a 2-speed self-tailing winch. 2) Other boarding methods include: ladder amidships or stern, stirrup line to winch, life raft and dinghies, etc.

The Quick-Turn Overboard Recovery Method

The essence of this recovery method is that it combines a number of simple, previously consolidated skills which together form a safe basis for controlling the recovery. For practice, use a "dummy" which can consist of a five-gallon jug partially filled with water secured to a one gallon jug (to simulate a head).



Standard Procedure for the Quick-Turn Recovery

① A crew member has fallen into the water. Shout "crew-overboard" and throw cushions, PFDs, or life ring.
② At least one designated crew member is assigned to keep eye on person in water.
Remaining crew members get boat under control.
③ Sail on a beam reach.
④ Tack boat reach to reach.
⑤ Turn boat away from wind onto a very broad reach.
⑥ Turn boat toward wind onto a close reach course when person in water is abeam of boat.
⑦ Adjust boat speed with sails to approach person slowly.
⑧ Stop for pickup, get line to person, and bring on board by best available means as quickly as possible.

First Aid and CPR

Encourage your students to learn first aid and CPR and to keep their skills up to date. Make sure your students understand why this is important.

Emergency Steering

Demonstrate how to rig and use the emergency tiller.

Key Points to Emphasize:

- Boats with wheel steering should have an emergency tiller in the event that the wheel or steering system is damaged.
- The emergency tiller fits onto the head of the rudder post -- often found just aft of the wheel under an inspection plate in the seat or cockpit sole.
- Most production boats pay little attention to emergency tillers with the result that many are difficult to use because of interference in the cockpit or lack of leverage with a stubby tiller.
- In some cases, blocks and tackles are needed from the tiller to the rail on either side to create enough purchase.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Make your students aware that on some cruising boats, the rudder post does not extend to the deck and may be found under the bunk in an aft cabin. This means the helmsman must steer by instruction given from the deck. A hand bearing compass may also be used for steering below deck.

Flooding

Explain to your students that on a cruising boat, flooding is most likely to occur as a result of:

- a faulty through-hull fitting, i.e., transducers, shaft log, rudder post
- a collision or grounding
- a knockdown that floods the companionway and open hatches
- the butt of a broken mast holing the hull

Standard Procedure: When water is detected, head for the closest harbor, and have at least one person start pumping. If the flow is serious, head for any shallow water, bail with buckets as well as pumps, have everyone put on PFDs if not already wearing them, call for help on the VHF radio (you will need to know the boat's position), and then look for the cause.

The person most familiar with the boat should search for the source.

- If water is running in the bilge, follow the course "upstream."
- If the source is not obvious, check all through-hull fittings and close seacocks. If engine is running, do not close the raw water intake. (If the engine intake is the source of the trouble, shut down the engine before closing the seacock.)
- If the water is coming through a crack or hole in the hull, consider whether heeling under sail would bring the hole above water.
- Attempt to stem the flow by covering the hole with available material (such as a floorboard over a cushion used as a gasket, or a sail in a sail bag). The filling may be secured in place against the water pressure by wedging a pole, oar, or door between the patch and the overhead. Make your students aware that they may have to get inventive with their remedy, which could include tearing out some interior furniture.

Anchoring

If the seas are calm enough and the depth is shallow enough, anchoring can allow a crew to focus their attention on fixing a problem and preventing the boat from getting into more difficulty. Especially when sailing shorthanded, anchoring may give time to resolve a problem with:

- Steering
- Rigging
- Engine or prop
- An injury
- A leak

Internationally Recognized Distress Signals (as listed in the COLREGS)

- Red star shells
- Fog horn continuously sounding
- Flames on a vessel
- Gun fired at intervals of one minute
- Panel with orange background and black square and ball
- ••• – – – •••
- "MAYDAY" by radio
- Parachute red flare
- Dye marker in the water
- Code flags "November," "Charlie"
- Black square flag over a black ball
- Waving arms up and down
- Smoke

🕮 ADDITIONAL SOURCES OF INFORMATION

COLREGS
The Annapolis Book of Seamanship by John Rousmaniere
Colgate's Basic Sailing by Steve Colgate
Steve Colgate on Cruising by Steve Colgate
Easy on the Helm: Boat Handling under Sail and Power by Tom Cunliffe

ACTIVITIES

- Students practice overboard recovery methods.

ANCHORING

KEY CONCEPTS TO TEACH

- Inspection and checks before departure
- Anchoring equipment to suit conditions
- Suitable anchorage
- Anchoring under power

STUDENT OUTCOMES

PRACTICAL SKILLS:

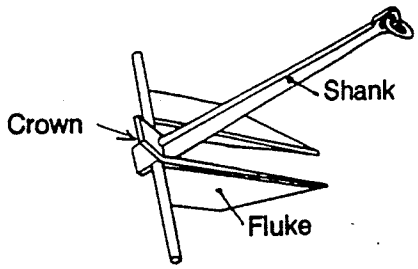
- Check anchoring system: anchors, shackles, rodes, windlass
- Selection of an anchorage
- Anchoring under power (single anchor)
- Retrieving under power

KNOWLEDGE SKILLS:

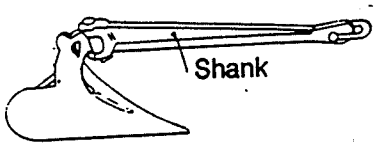
- Different types of anchors
- Scope
- Anchoring etiquette

Three types of anchors frequently used on Basic Cruising sailboats are:

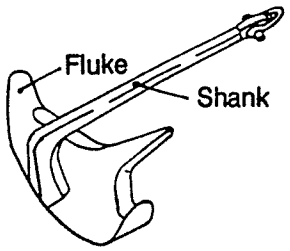
- **Lightweight-type**, such as Danforth, Traditional and Hi-Performance (West Marine), and Guardian and Fortress (Nav-X).
  - ✓ Light weight and easy to stow
  - ✓ Good choice for sand, mud (hard), clay (soft) bottoms
  - ✓ Poor choice for grass bottoms
  - ✓ Mixed results for rocky bottoms



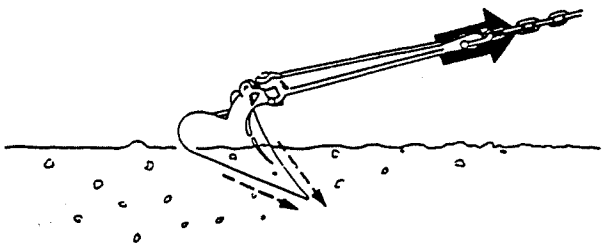
- **Plow-type**, such as CQR and Delta (Simpson Lawrence).
  - ✓ Less holding power per pound and is more awkward to stow than the lightweight-type
  - ✓ Good choice for sand, mud, clay, grass (better than lightweight-type because it weighs more), and rocky bottoms
  - ✓ Popular with larger cruising boats



- **Bruce**
  - ✓ Less holding power per pound and is more awkward to stow
  - ✓ Good choice for sand, mud, clay, grass, and rocky bottoms.



☞ **INSTRUCTORS TAKE NOTE...**
A plow, lightweight, or Bruce anchor digs into the sea bottom when pulled at a low angle to the bottom, and releases when pulled up vertically.



Rodes may be:

- **A combination of nylon line and chain.** Typical arrangement for small to large keelboats. Amount of chain varies on the type of bottom, water depth, and wind and sea conditions. Normally a short length (6 to 12 feet) of chain is added to improve penetration of the anchor and its holding power by keeping the pull on the anchor parallel to the bottom and to prevent the nylon line from chafing on the bottom. The amount of chain is increased for deep water, coral bottoms, and high wind and sea conditions.

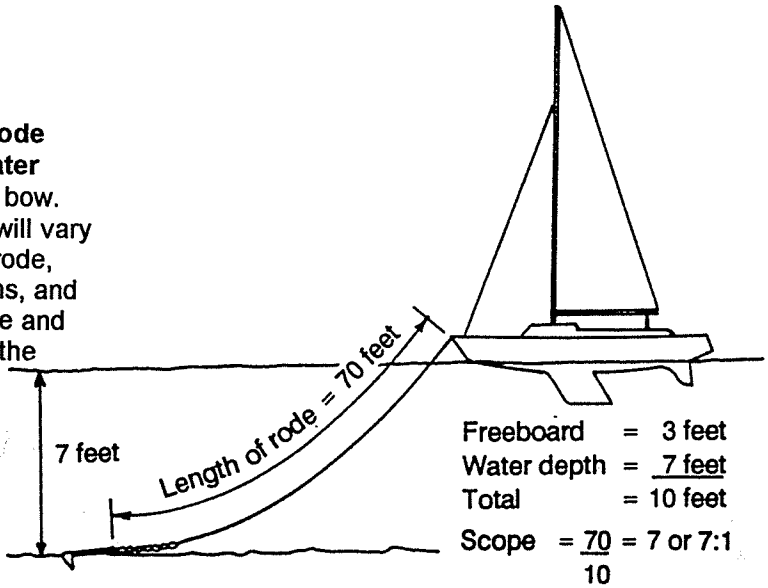
  Nylon is the best material for anchor lines because it has more stretch than Dacron, polypropylene, Spectra, or Kevlar. 3-strand nylon has more stretch than nylon braid. Stretch is desirable because it helps cushion the load on the anchor and boat.

- **All chain.** Typical arrangements for large cruising boats with windlasses.

The **holding power** of an anchor is affected by:

- Type of anchor
- Size and weight of anchor (size has a greater affect on holding power than weight)
- Type of bottom (hard sand is best for holding power)
- Scope (more scope, more holding power)

Scope is the ratio of **rode length** to **depth of water plus freeboard** at the bow. The amount of scope will vary depending on type of rode, wind and sea conditions, and length of stay. The rise and fall of tide will change the amount of scope.



Typical Scopes:
7:1 Line/chain rodes;
4:1 Line/chain rodes;
3:1 to 5:1 All chain rodes

Anchoring Decisions

Factors to consider when selecting a place to anchor:

- Depth of water
- Suitable type of bottom for anchor
- Protection from wind, waves, and boat traffic
- Lee shore

Room to swing on anchor

- Whether nearby boats will react in a similar manner to changes in wind and current
- Strength and direction of current

> ☞ **INSTRUCTORS TAKE NOTE...**
> Emphasize to your students that they **should not anchor:**
> - Too close to other boats
> - In a channel
> - In a cable area
> - Among moorings
> - Where the anchor will damage a coral reef
> - Outside a designated anchorage without using a black ball day shape or an anchor light at night.

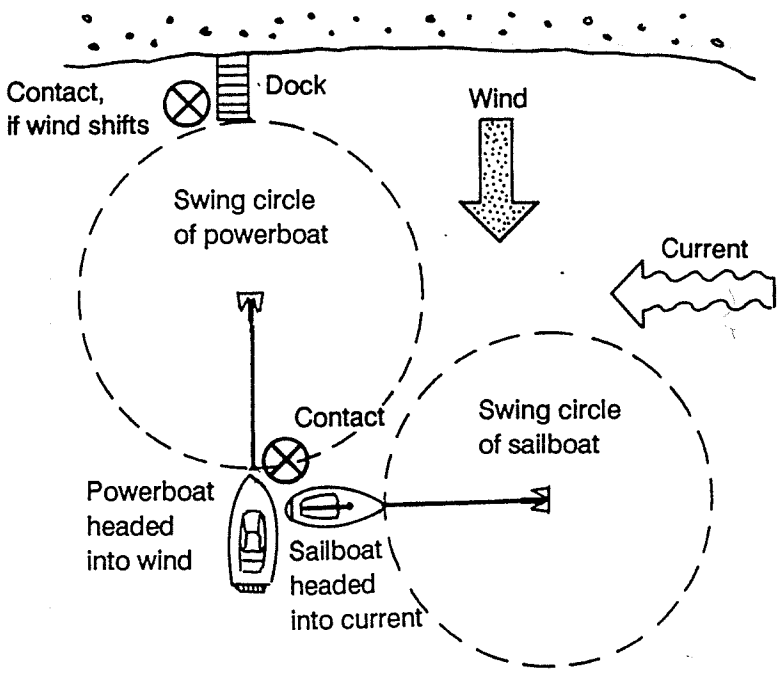
Depth of water. Determine whether:

- ✓ Enough water under the keel for a 360-degree swing around the anchor at low tide
- ✓ Depth is not too deep for amount of ground tackle
- ✓ Sufficient scope will be achievable at all levels of tide

Type of bottom. Sand is always good; avoid bottoms with long thick grass and soft oozy mud. Watch out for underwater power lines and moorings.

Protection. Anchor in the lee of the land or a breakwater, and take into account the affect of a possible wind shift. Don't anchor in an active channel.

Room to swing. Make sure boat can swing 360 degrees without hitting an obstruction (fixed object, dock, breakwater, sandbar, shallow spot, other boats, etc.)



When anchoring among other boats, anchor with similar type of boats in a similar manner, so that if the wind or current changes, your boat will swing on its anchor in the same way as the nearby boats. For example, power boats with high windage and small underwater profiles will react differently than keelboats with low freeboards and deep keels.

Boats with deeper or greater underwater profiles will be affected more by current, and in very light winds will often lie headed into the current instead of the wind.

✓ **HOT TIP FOR YOUR STUDENTS...**
When anchoring among other boats, recognize that boats anchored on chain use less scope and thus have smaller swinging circles than boats on rope rodes.

Strong current can also make the surface of the water rough, especially if it is in the opposite direction from the wind. More scope may be needed in strong current.

Preparation for Anchoring

1) Select specific site to anchor by inspecting area.
2) Refer to chart for information on depth and type of bottom.
3) Establish communication method to use for anchoring.

Procedure for Anchoring Under Power:

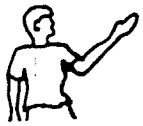
1) Come up to anchoring spot slowly from down wind or from direction in which other boats are lying.
2) Check the depth on the fathometer and add the additional rise to high tide.
3) When boat has stopped (person on bow will see that positions of anchored boats or buoys are not moving relative to the land), the anchor may be dropped clear of the topsides. Remind all to stand clear of the rode.
4) With the anchor on the bottom, the helmsman, can put the engine in slow reverse and then let the boat drift backward along the approach track. If the wind blows the bow off, let it blow the boat back with the engine in neutral.
5) When five or more times as much rode has paid out as high tide depth (more if the chain length is shorter than 12 feet), snub the anchor rode with a round turn on a cleat or a few turns on the gypsy of a windlass. As the weight of the boat tensions the rode, the bow of the boat should come back in line.
6) The helmsman can put the engine into reverse again and/or gradually increase throttle to help set the anchor into the bottom. With reverse at low throttle for thirty seconds or so the anchor should have dug in.
7) As reverse throttle is increased, the crew on the bow should watch the rode for any sign of bouncing or twitching which is a sign that the anchor is dragging on the bottom, If it stops shortly, all is well. If it continues, the crew will have to pull the anchor in and try again.
8) If anchor is fouled by weed or chain, clear the problem and try again.
9) If one anchor is holding marginally, let out more scope. For added security where the conditions are not going to swing the boat a lot, set another anchor from a dinghy at an angle of 60° to the first one. (See below.)

   If the anchor doesn't set, haul it up and start the process over again.

✓ HOT TIP FOR YOUR STUDENTS...

Hand signals are frequently the best way to communicate when anchoring. Some typical examples are:.

PORT



STARBOARD

STRAIGHT AHEAD

STOP

✓ HOT TIP FOR YOUR STUDENTS...

When backing down gently to set the anchor, watch the rode at the bow to see if it is bouncing, which usually indicates the anchor is dragging rather than digging in securely.

Tell students that when anchoring near other sailboats, they should drop anchor astern of another boat that looks similar to theirs. This will allow the boats to swing on their anchors without making contact and entangling their ground tackle.

After Anchoring

Students should be encouraged to look at where the boat is positioned in relation to other boats and landmarks after anchoring. Explain how ranges and compass bearings can be taken on landmarks to use later to determine whether the anchor is dragging, and that the farther away the landmarks are the better, so that swinging on the anchor is not misinterpreted as dragging.

TEACHING TIP...
If you anchor for lunch or short afternoon break, you may also use the time to explain more systems and VHF use.

Procedure for Raising an Anchor Under Power

1) Start the engine.
2) Take in the anchor line until it stands vertically to the water (bow is over anchor).
3) Pull the line directly upward, which should break the anchor free from the bottom (snubbing the line in a swell should also break it free). If not, use power to break out or change angle of pull.
4) Coil the line as the anchor is brought up. Swish the anchor back and forth in the water to clean it.
5) When the anchor is back on board the boat, stow it out of the way.

ADDITIONAL SOURCES OF INFORMATION

The Annapolis Book of Seamanship by John Rousmaniere
Steve Colgate on Cruising by Steve Colgate
Easy on the Helm: Boat Handling under Sail and Power by Tom Cunliffe

ACTIVITIES

- Students practice anchoring.

VHF RADIO

KEY CONCEPTS TO TEACH

- Appropriate use
- Radio procedures

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Operation of VHF radio, including channel usage, call sign
- Procedures and operation in simulated emergency situations

VHF radio is an exceptionally useful piece of equipment on a cruising boat.

Key Points to Emphasize:

- By law, its use is supposed to be limited to:
  - ✓ Safety
  - ✓ Navigation
  - ✓ Business
- It can pick up continuous NOAA weather forecasts.
- It can summon help in an emergency.
- It can be used to avoid collision.
- It can link a boat through marine operators to the telephone network.
- It can be used to arrange dockage and rendezvous.
- Its use is commonly abused by recreational boaters who monopolize channels with inane chitchat.

VHF CHANNELS AND DESIGNATED USES...

16	Emergency, safety, and commercial calling
9	Non-commercial calling ship-to-ship
68, 69, 71, 78	Non-commercial ship-to-ship or ship-to-shore
72	Non-commercial ship-to-ship
24 to 28	Marine operators
84 to 87	Marine operators
88	Marine operator for Great Lakes, St. Lawrence Seaway, Puget Sound and Str. of San Juan de Fuca
13	Navigational, bridge to bridge
67	Navigational, Lower Mississippi River

Operating a VHF Radio

VHF radio is regulated and licensed by the FCC, and any radio transmission on a vessel requires the use of call letters issued with the station license.

For students unfamiliar with VHF radio, encourage them to listen to get familiar with radio communication. They will hear good and bad habits.

Key Points to Emphasize:

- Make initial contact on Channel 16 or other specified channel -- Channel 9 is used by non-commercial boats in Coast Guard Region 1 (Northeast).
- If the party being called does not respond immediately, wait a couple of minutes between tries.
- After reaching another pleasure boat, change to a working channel designated for non-commercial use.
- Only one person can talk at a time, or both transmissions will break up.
- When the microphone key is depressed, the radio operator will not receive any transmissions.
- Do not talk over someone else.
- Keep conversations brief.
- A high power (25 watt) transmission radiates in all directions up to 15 to 25 miles.
- Use low power (1 watt) when possible to limit interference with others trying to use the channel over the horizon.

RADIO EMERGENCY PROCEDURE...

Repeat all information.

- If an emergency is immediately LIFE THREATENING:
  - ✓ Use the call "MAYDAY" on Channel 16 high power -- repeat 3 times.
  - ✓ State the name of your boat.
  - ✓ Take finger off the microphone key and wait for a response. With or without a response, continue broadcast.
  - ✓ State your position (either Latitude and Longitude or range and bearing from point on a chart).
  - ✓ State the nature of the emergency (fire, sinking, serious bleeding, etc.).
  - ✓ State the number of persons on board and condition.
  - ✓ Describe vessel: hull color, rig, etc.
  - ✓ Stand by for further contact.
- If the emergency is <u>not</u> life-threatening:
  - ✓ Use the call "PAN, PAN" and proceed as above.

Ship-to-Shore Communication

Ship-to-shore calls through marine operators can keep a boat in touch with parties on shore. Recently, cellular telephones have found their way onto cruising boats.

Key Points to Emphasize:

- Marine operators stand by on designated channels.
- Anyone may place a collect call to a number ashore. For regular use, a boat can set up a billing account in advance with an operator.
- Telephone cards are not recommended -- the number may be overheard. It is like announcing your card number in an airport waiting area.

WEATHER

KEY CONCEPTS TO TEACH

- Awareness of local conditions
- Effects of general weather systems

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Recognition and forecasting of prevailing local conditions

KNOWLEDGE SKILLS:

- Weather recognition and forecasting for a two- to three-day period

Review with your students:

- The importance of obtaining weather and tidal information before they go sailing
- Where they can get this information
- Typical weather associated with high and low pressure systems, cold and warm fronts
- Local conditions, i.e., geographic and thermal affects on wind, afternoon thunderstorms or squalls, fog, strong current

Some of the highlights are listed below. If you need more information, review the "Weather and Current" chapter in the Basic Keelboat Instructor manual.

Information Sources for Weather Forecasts

- NOAA weather broadcasts over dedicated "weather" radios, VHFs, or marine radio
- Local radio station (FM or AM) broadcasts of local weather/marine conditions and forecasts
- Daily newspapers that publish weather maps and forecasts (often include boating forecasts)
- TV -- local weather reports and forecasts
- Computer online services

Information Sources for Tides and Tidal Currents

Tide Tables -- provide times of high and/or low tide. Sources include:

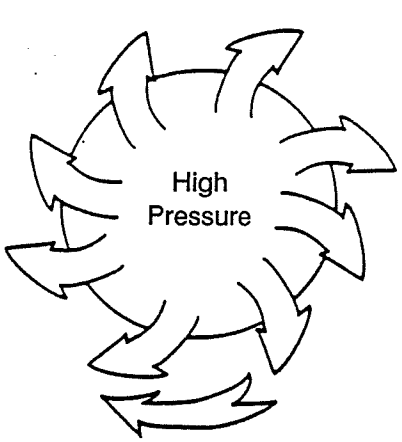
- Local tide tables printed locally, i.e., marine/fishing supply stores, chandleries, marinas, sailing schools
- Commercially published tide and current tables, including tidal current charts if available, i.e., marine almanacs, *Elridge*
- Government publications: *Tide Tables* (times of high and low tides); *Tidal Current Tables* (times and velocity at slack water, and maximum flood and ebb)
- Local Notice to Mariners

VHF Radio -- NOAA weather channel.

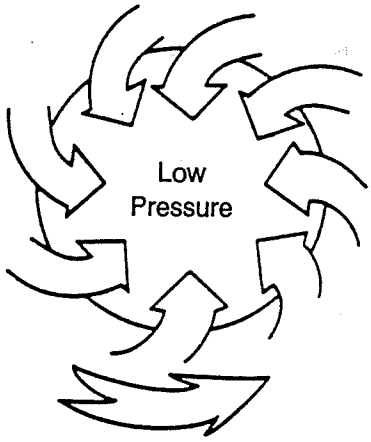
Highlights of Weather Associated with General Systems

Low pressure systems can have poor sailing weather with:

- Strong winds
- Rain
- Storms



Air Flows **Out** in a **Clockwise** Direction



Air Flows **In** in a **Counterclockwise** Direction

✓ **HOT TIP FOR YOUR STUDENTS...**

The barometer can be used to determine whether a high or low pressure system is approaching.

↓ **Falling** barometer (falling pressure) -- expect a low pressure system. Head for home or stay in port.

↑ **Rising** barometer (increasing pressure) -- expect a high pressure system. Clear sailing.

High pressure systems usually bring good sailing conditions with:

- Either light (weak high pressure system) or brisk (strong high pressure system) winds
- Sunshine
- Good visibility

Strong (high or low) pressure systems usually bring stronger winds, and conversely, weak systems bring less wind.

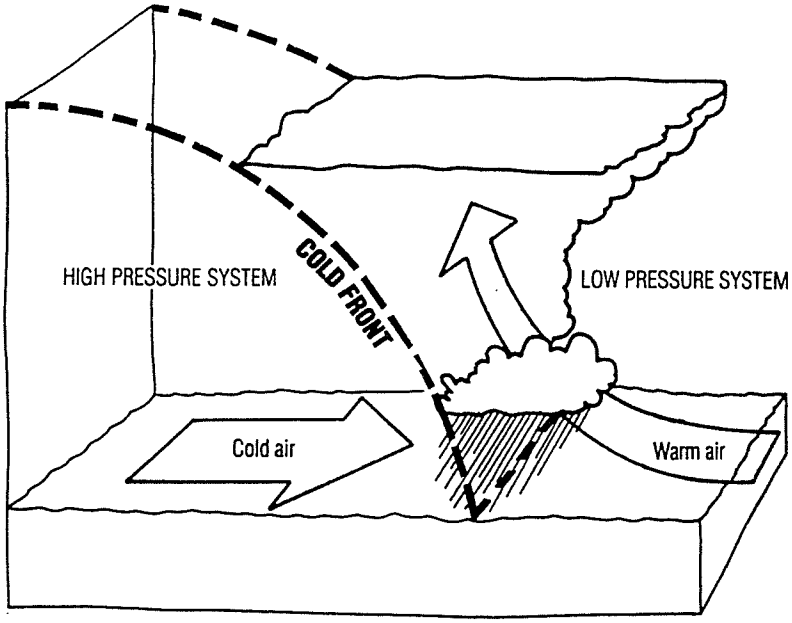
Isobars (lines of equal pressure, like contour lines of equal height on topographic maps) on weather maps can be used to predict the strength and extent of pressure systems, and even a rough idea of the wind direction at any particular point. Isobar lines close together indicate a strong pressure system with strong winds. The wind direction roughly follows the isobar lines -- in a clockwise direction for high pressure systems and counterclockwise for a low pressure system. So isobars can be very useful in helping to forecast general weather conditions.

Fronts are another important system that can be used to predict general weather conditions. They bring:

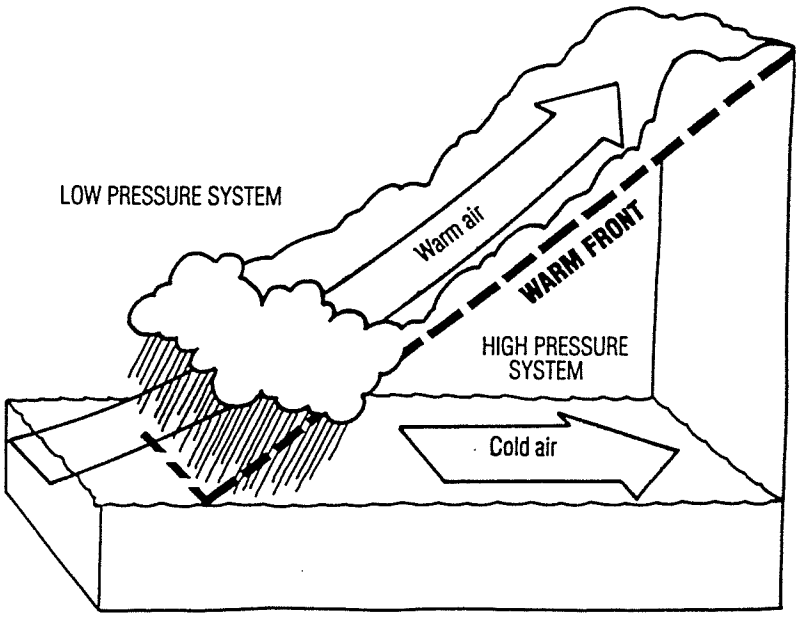
- Temperature changes
- Clouds
- Rain
- Changes in wind direction and velocity

Fronts

What we call "weather" is usually the result of warm and cold air masses (low and high pressure systems) meeting, which causes clouds to form, rain to occur, and changes in wind direction and velocity. The border where the warm and cold masses meet is call a **front**. When colder air replaces warmer air, it is called a **cold front** and you can usually expect a sudden drop in temperature, increasing winds with a sudden clockwise shift, heavy rain, and perhaps thunder and squalls. A **warm front** occurs when warmer air replaces colder air and is milder than a cold front.



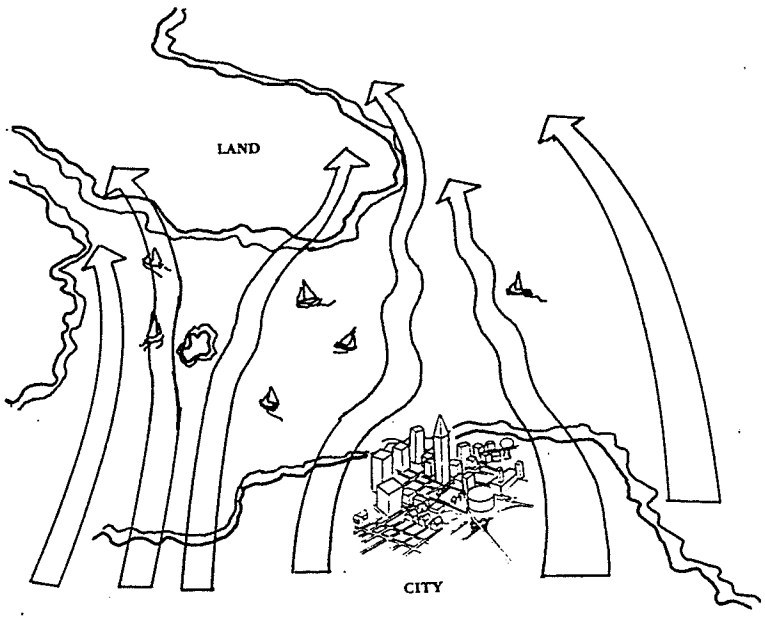
High pressure systems contain cool, dry air that sinks to the ground. When these systems meet warmer air masses, clouds, rain and strong winds can occur.



Low pressure systems contain relatively warm air that has a tendency to rise. They generally move more slowly than high pressure systems and the rain and wind created when they meet cold air masses is less violent.

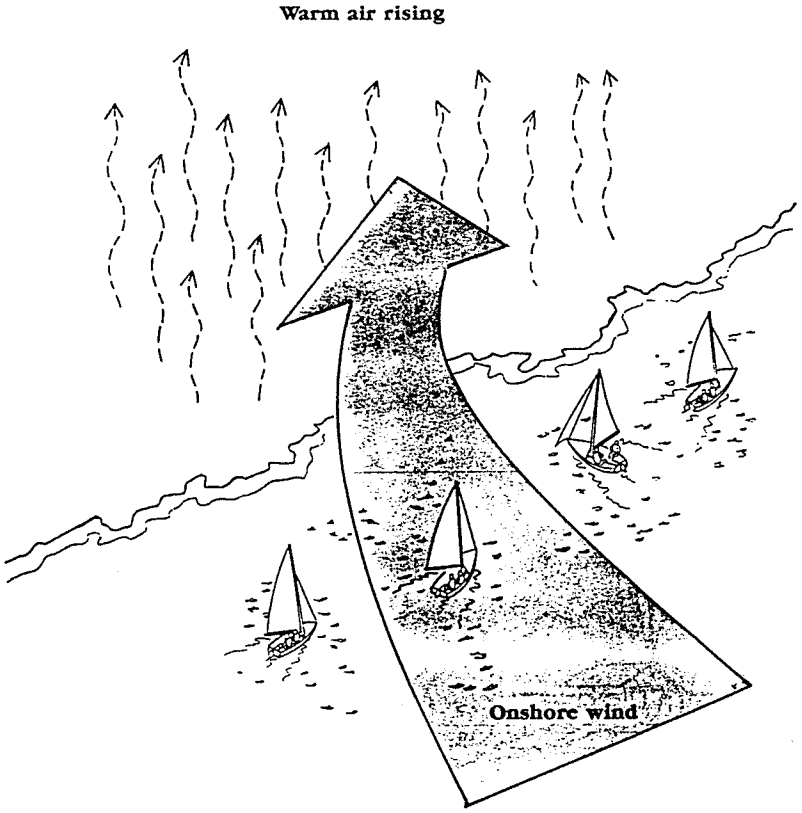
Geographic Affects on Wind

Wind can be affected by local geography. If a body of water is surrounded by large buildings, hills, or other obstacles, wind direction and strength will change often.
If you sail on a long narrow lake, the winds may blow up the lake in the morning and down in the afternoon. Or, if it's a wide lake surrounded by hills, the winds may blow off the land in the morning and to the land in the afternoon.



Thermal Affects on Wind

Local winds can be caused by temperature differences between land and water.
Onshore winds or sea breezes occur when the air blows from the water onto the shore. Onshore winds can be quite strong during the afternoon as a result of the air being pulled in by the hotter air rising over the land.



MANEUVERING UNDER POWER

KEY CONCEPTS TO TEACH

- Control of an auxiliary sailboat under power

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Close-quarters maneuvering: boat control and command of crew
- Recovery plan for engine failure in crowded harbor

KNOWLEDGE SKILLS:

- Effects of prop walk

Props and Lines in the Water

Explain to your students that the greatest nuisance to maneuvering under power is getting lines fouled in the propeller. The lines may be those carelessly left hanging over the side or lines connected to moorings, fish traps, or lobster pots.

Key Points to Emphasize:

- Keep lines on board and avoid running over things in the water.
- If they see something too late, throttle back and take the engine out of gear.
- If they snag something and wrap the prop, the engine will probably stall. You will have to dive under the boat to cut the line off the shaft.
- *Remember courtesy:* Even though the line is a nuisance to them, it may mark valuable gear (e.g., lobster pots) that belongs to someone else, and it was their fault for snagging it. Be considerate to the owner of the gear, and if at all possible, retie a float to the line before they go.

Factors that Limit or Effect Maneuvering under Power

It is well to think of an engine as an auxiliary on a sailboat if for no other reason than to recognize that the boat was built to design specifications that favor sailing and often hinder powering.

Key Points to Emphasize:

- **Size of Propeller and Number of Blades--** Propellers create drag on a boat under sail. A large three-bladed prop can reduce sailing speed by a knot although the boat would handle better under power. Typically, props are kept as small as possible and can further reduce surface area by having two blades instead of three.
- **Folding or Feathering Propeller** -- For performance sailing, a folding or feathering prop is used to minimize interference with water flow.
- **Underbodies** -- As well as a variety of prop types, the underbodies of boats vary widely. There is no way to look at a boat and know how it will handle under power.
- **Practice** -- Make students aware of the importance of practice to get the feel of a boat that is new to them.

Important things to find out about an unfamiliar boat:

- **Engine controls** -- There is little standardization on appearance and placement of gear shift, throttle, and engine start and stop controls. (Engine stop levers may even be inside the companionway on some boats.)
- **Kind of propeller** -- Prop type will give a clue as to handling.
- **Recommended cruising speed** -- Each engine has an optimum speed (rpms) for efficient fuel use and engine care.

Maneuvering under Power

Changing gears -- Transmissions are expensive to replace.

- The first rule: *Always back the throttle down to engine idle speed before changing gears.*
- The second rule: Always back the throttle down to engine idle speed before changing gears.

Prop walk -- Sailboats tend to turn under power even though the rudder is centered because:

- The shaft comes out of the boat at an angle.
- The directional spin of the prop creates a side force.

Prop walk is more pronounced in reverse and more noticeable at low speeds. Explain to the students that prop walk can work for or against them when maneuvering in close quarters.

Props are either "righthanded" (spinning clockwise when looking forward from the stern) or "lefthanded" (spinning counterclockwise).

Key Points to Emphasize

- Righthanded props in forward gear produce a slight pull to starboard. In reverse, there may be a significant pull to port. This is the common condition on sailboats.
- Lefthanded props behave in the opposite fashion.

Forward gear -- Props are generally located forward of the rudder on centerline. In forward gear, the prop pushes water aft and past the rudder. That water flow creates steerage even at low boat speed.

- With brief bursts of forward throttle and the rudder turned, a helmsman can spin the boat in a tight circle with little boat speed.

Reverse gear -- The prop pushes water forward so that little water flows over the rudder for steerage until boat speed is developed. Some boats, however, steer very well in reverse at two knots or so and with less tendency for the bow to fall to leeward, making backing into a slip easier in a crosswind.

- Prop walk is evident at low speeds.
- Always keep a good hold on the wheel and use as little helm as possible. As boat speed develops in reverse, water flowing forward can catch the rudder and slam it hard against the stops in the steering system. The force can damage the rudder, the stops, or a crew's hand that happens to be in the way of the spokes as the wheel spins.

Demonstrating and Practicing under Power

This is best done away from other boat traffic that may be confused by your boat's erratic course changes. But let your students practice near a stationary reference point so they can easily see the effect of their actions. Buoys may suffice. Another option is "mock dock" teaching aid.

Boathandling in Close Quarters

This can be difficult but is an important skill for a sailor. It obviously is essential docking or approaching another boat. It is equally important for recovering something, or someone from the water.

- Going directly with, or against, the wind or current is simplest. The effects of windage and leeway are easily compensated.
- In a crosswind at slow speeds, the bow will be caught by the wind and tend to fall to leeward. Students need to learn to anticipate this. This tendency can be used to blow a boat off a dock or onto a dock, or to stop to windward of an object in the water. The engine is taken out of gear (to stop the prop spinning) and the boat drifts down on the object being recovered.

RETURNING TO DOCK/ CLEAN UP

KEY CONCEPTS TO TEACH

- Preparation
- Communication
- Docking considerations for larger boats
- Control of boat

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Docking under power (helmsman/crew coordination and skills)
- Docking under sail (helmsman/crew coordination and skills)
- Securing the boat properly

KNOWLEDGE SKILLS:

- Docking under power for upwind, crosswind, and downwind situations

Returning to Dock

Returning to the dock is not just the end of the day, but another opportunity to practice and integrate several distinct topics of the day.

- Maneuvering under power
- Line handling and knot tying
- Planning and crew work
- Safe boathandling
- When and how to douse sails
- Preparation for docking
- Arrival plan

Securing the Boat

The students may be tired, but they should learn to put the boat away properly:

- Secure and tidy docklines
- Coil and stow running rigging.
- Mainsail furled or flaked with sail cover on
- Deck hosed off as needed
- Wheel centered and wheel brake on
- Seacocks closed and bilge checked
- Perishable food out of the icebox
- Battery switches off
- Hatches dogged and companionway locked
- Check docklines, and fenders before leaving dock.

WRAP UP

Decision Making

Refer to page 1-124 in the Basic Keelboat Instructor manual to stress self-reliance and decision making in regard to larger boats and distances to sail.

Evaluation

A final multiple choice exam is only one tool to assess comprehension. You should be "testing" comprehension throughout the course by noting how well each student executes a skill or reasoning process.

The more you have watched and listened to the students the more certain you can be about awarding a certificate for skipper or competent crew. You are not doing anyone a favor by giving certificates to those "who just don't get it" yet. They are misled, and your program's reputation can suffer.

Clearly explain to each student in the debriefing his or her limitations and skill areas that they need to practice after the course.

Preview of the Bareboat Cruising Course

Explain to your students that practice is key to sailing just as in any sport or pastime. It is a matter of transforming "how to do something" into "doing something." Explain the importance to practice and become proficient in everything in Basic Cruising before taking the Bareboat Cruising course.

SECTION 4

BAREBOAT CRUISING HIGHLIGHTS

INTRODUCTION

The primary objective of this course in Bareboat Cruising (BBC) is to provide the students with the skills and resources to:

- Plan a cruise
- Acquaint themselves with an unfamiliar boat and location
- Sail, anchor, and dock the boat in normal conditions
- Live with others in the confines of a boat

In other words, to cruise an auxiliary sailboat or to bareboat charter comfortably and safely.

This course covers more than "sailing," which in a limited sense is the specific method of using the wind to move a boat. Some of the most important aspects of BBC involve how to *be* on the water. This includes environmental awareness, resource conservation, seamanship, courtesy, and careful navigation.

During the course, the instructor metaphorically removes the students' training wheels. The students must learn to assess situations and make decisions without input by the instructor. The instructor should not dominate the activities aboard and should encourage problem-solving by the students. The responsibility for self-reliance and vigilance should appear to pass to the students, even though the instructor ultimately remains in charge.

While a five-day course cannot possibly cover all conditions that a charterer might find,

- The instructor should present material in a way that students later will recognize variations and apply prudent solutions.
- The students should be encouraged to think rather than absorb information.
- The instructor must allow for students to connect the details of a technique to its overall purpose.

For example, it is well if a student knows that when using two anchors, a good angle between rodes is 60°, but the student also must realize when two anchors are worth the trouble of setting and retrieving, and that changing wind and current can cause problems.

The students will need to practice and refine their basic sailing skills, but by the time they take a Bareboat Cruising course, the mechanics of sailing -- sail trim, steering, and general boat handling -- should be approaching second nature. The more sailing practice the students have had, the easier a time they will have focusing on the new material that is covered in this text. Ideally, the basic sailing techniques and the cruising material should merge into an overall "boat sense."

Self-reliance is a great virtue in a cruising sailor. It contributes to a sense of freedom that most cruising sailors find very appealing. However, self-reliance is not the same as knowing everything there is to know about sailing. At this point, self-reliance helps students appraise their own competence and understanding. It provides the confidence of recognizing the limits of their knowledge and experience. A proper degree of self-reliance should keep a sailor suitably cautious.
Students who successfully complete Bareboat Cruising must be prepared to cope with unfamiliar charter boats, crowded cruising grounds, navigation rules (rules of the road), variable weather, and less experienced crews.

Vigilance -- an acute awareness of potential danger -- on a boat or beyond is an additional virtue to a cruising sailor. If a sailor is able to recognize a problem in the making, the dangerous consequences may be avoided. For example, a good sailor will consider more than one scenario when near shipping lanes: a ship may stay in the channel at a constant speed, or it may be accelerating and turning after picking up a pilot.

More layers and interrelationships should become apparent during this course. For example, navigation should not be considered a separate discipline, but an integral part of what cruising is. A metaphor may help to describe the process of learning to cruise. In Basic Cruising, the students learned the simple melody of sailing a cruising boat. In Bareboat Cruising, the students are working on the orchestration of that melody. It is the job of the instructor to guide the tone and harmony of the completed composition.

Assumptions

This section assumes that the instructor's school will being teaching this material within the standards set forth by the Training Committee of US SAILING and that:

- Students have successfully completed Basic Cruising (BC) recently, or recent equivalent experience, and have the skills of a BC skipper and crew.
- The course will adequately cover all the skills and knowledge requirements for Bareboat Cruising certification (about 35 to 40 hours of instruction).
- On board a cruising boat with an auxiliary engine and wheel steering (boat length about 30 to 45 feet).

☞ **Successful completion of the course for Bareboat Cruising certification requires the student** to be able to responsibly skipper, crew or bareboat charter an inboard auxiliary powered cruising sailboat within sight of land to a port or anchorage during daylight hours in moderate to strong wind and sea conditions.

PRE-COURSE

KEY CONCEPTS TO TEACH

- Thorough preparation makes everything else easier
- Review Basic Cruising material
- Preview of Bareboat Cruising course and materials
- Self-assessment of student's capabilities

The importance of preparation in cruising can be instilled even before the course starts. The farther a boat travels from immediate help, the more that planning the cruise and knowledge of the crew become essential. Course descriptions, pre-course information packets, and response forms from the students should all relate to the outcomes specific to this course so that the course can run as smoothly as possible for both the instructor and the students.

Pre-course preparation is important because

- Mistaken expectations can get a course off to a slow start and lead to confusion among the students. The pre-course material provides a framework which the course work will fill in.
- Reviewing the Basic Cruising manual and checklists before the Bareboat Cruising course starts can remind students of what they already know (or once knew). Alert them that they may be called upon to explain one or more of a dozen BC techniques or procedures to their fellow students.
- Knowing the physical condition of the students helps an instructor to anticipate needs. There is no reason to assume that someone with a bad knee or diabetes cannot be a competent sailor, but the instructor should be aware of limitations.
- By extension, the students should be taught to ask questions when they are selecting crew members in the future. For example, it is useful to know that your helmsman is red-green color blind.

TEACHING TIP...
Suggested BC topics for the students to review prior to the course, and which they may be asked to explain to the other students.

- ✓ Safety zones
- ✓ Daily engine checks
- ✓ Engine starting procedure
- ✓ Use of the head
- ✓ Planning for leaving the dock
- ✓ Use of spring lines
- ✓ Use of a winch
- ✓ Approaching a mooring
- ✓ Quick-Stop maneuver
- ✓ Reefing
- ✓ Basic aids to navigation
- ✓ Navigational Rules for crossing situations

STARTING THE COURSE

KEY CONCEPTS TO TEACH

- Review of Basic Cruising highlights
- Overview of Bareboat Cruising course

Since most, if not all, of this course will be spent living on board the boat, it is important for the students to get to know the boat and each other as quickly as possible.

Get To Know Your Group

Introduce yourself. Mention some of your professional background, and perhaps why you like cruising. Then invite the students to identify themselves and the reasons they have enrolled in the course. You might ask them if they have ever had frightening experiences on boats -- such as, collisions, squalls, or sailing with an inexperienced skipper. Once you and the other students know something about each other, you can begin to tailor your presentation to the individual group. You have pertinent information on which to base examples and explanations. It is important to create an open dialogue with your students from the beginning.

Review the Highlights of Basic Cruising

Checklists on boat systems and getting underway are a good way to get the course moving and remind the students that they have reference material at their disposal to refresh their memories. (Review relevant topics in the Basic Cruising section.)

Ask each student to explain one of the topics of Basic Cruising as you introduce them to the training boat you will be using. If the student is incomplete or inaccurate, use the "criticism sandwich" (explained in Basic Keelboat Instructor manual to: 1) reinforce what they did well, 2) touch on the shortcomings and 3) encourage them to gain a better understanding during the BBC course.

Give an Overview of the Bareboat Cruising Course

Something along the lines of the introduction above will set the stage for the students starting your course. Even if they should have *read* the manual, or *watched* the video, you will need to *tell* them what they are going to learn. Remember that your students may be understanding the importance of what you say for the first time. Repetition and multi-pathways learning are tried and true teaching tools. (See the Teaching Theory and Techniques section in the Basic Keelboat Instructor manual.)

LIVING ABOARD

KEY CONCEPTS TO TEACH

- Learning to live in close quarters with strangers
- Welfare of the boat and crew comes before individual

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Check and operation of galley equipment, including stove and fuel
- Provisions inventory list and galley assignments

In many ways, cruising is glorified camping. The crew may be sleeping on bunks covered in Ultrasuede in a teak-lined cabin without bugs and forest creatures, but it is not deluxe resort accommodations. Fresh water, electricity, and stowage space are limited. Strangers may be snoring four feet away from you, or leaving their stuff on your bunk. Learning to live in close quarters is part of cruising, and the instructor should provide the lead as to the proper decorum and concern for the whole crew. The instructor never relinquishes responsibility when on board with students.

Before Sailing

Packing. Obviously, the crew must choose and pack personal gear. From the point of view of instruction, the pre-course information should give tips on weather conditions and a recommendation of clothing selection. Students who are comfortable learn better.

Part of learning to cruise is packing for limited stowage. Students should be given a maximum volume into which their packed duffel bag would fit. Only soft luggage has a place in the confines of a cabin.

Provisioning. Is probably not something that the students will participate in during your course, but they should see, or be given a copy of, a thorough

✓ HOT TIPS FOR YOUR STUDENTS...

Pack a duffel bag for versatility and convenience:

- Clothes that can be worn as layers serve a range of temperatures and minimize overall quantity
- Zip-closure plastic bags of all sizes are useful to organize and locate small items -- such as wallets, jewelry, and toiletries.

provisioning list to help them learn what needs to be considered when providing for four to six people for a week (with some simple extras in case weather prevents a scheduled dinner ashore or one crew member eats like two). Along with food and beverages, the list should cover such things as seasonings, sugar, ice, paper products, sun lotion, flashlight batteries and other "consumables."

Stowage. Stowing personal gear may come second to the boat's needs. Stowing provisions depends on type:

- **Dry goods** such as cereals, rice, pasta and crackers need a dry location in an upper locker or in plastic bags or containers.
- **Glass** needs protection from rolling or bouncing. Narrow shelves with high fiddles are good; medium sized plastic bins or milk crates in lockers under the settees also work well.
- **Canned goods** are resistant to most stowage areas on a boat, but will rust over time and can lose their labels if stowed close to the bilge, leading to true "potlucks" -- as well as the potential for the sodden paper to clog a bilge pump. A solution is to remove the labels and mark the cans with an indelible ink marker.
- **Refrigeration** is almost universal on American cruising boats, but the system needs more attention than a household unit. Refrigeration may run off shore power or through a compressor hooked to the engine or generator that is run for a limited time each day. The temperature needs to be monitored, and every time the lid -- or, especially, a front opening door -- is opened, the box loses cold air. The less the box is opened the better. Some people find that keeping soft drinks in a separate cooler reduces the need for running the refrigeration.

There are many tips about provisioning, stowage and use that are beyond the limits of this manual. Cruising "lifestyle" books and magazine articles can augment the particulars.

Here are some general suggestions and guidelines:

- Living with strangers is something some people adjust to better than others. Even friends may act in unexpected ways in close quarters, and adjustments must be made by all. The instructor can help by setting the ground rules:
  - ☞ Respect other people's space and belongings. Allow private time to read or nap without interruption.
  - ☞ Allocate crew stowage space and do not go into an individual's locker without permission (even if it is your boat).

- ☞ Specifically, tell everyone to clean up after themselves and not leave personal gear in the common living areas of the boat or on the chart table.
- ☞ Remind everyone to minimize time spent in the head.

- Galley use needs instruction. Systems differ from boat to boat. Provide specific instructions as to how the galley is to be used and by whom, including:
  - ☞ The potential dangers and safety devices of the stove and fuel must be understood and respected. When not in use the propane solenoid switch for the fuel supply must be turned off. (It may also have a breaker on the electrical panel.) Gimbaled stoves are wonderful, but a large pot of water -- possibly boiling hot -- can make the stove top heavy and dangerous. When at anchor, the stove should be locked from gimbaling. When cooking underway, it is always advisable for the cook to wear long pants and shoes. In bad weather, foul weather gear pants and boots are better. A strap at hip level is an excellent way to prevent the cook from falling toward the stove on one tack or across the cabin on the other. (More about galley dangers are found under Fire in this section.)
  - ☞ Stowing food in lockers and the refrigerator must take into consideration heeling and pitching. One incident with a carton of milk overturned in the refrigerator is usually a sufficient lesson.
  - ☞ Washing up brings up three important points:
    1. Very little fresh water and soap are needed for washing up if all dishes and pots are wiped thoroughly before being stacked in the sink.
    2. Boat drains get easily blocked by food waste.
    3. It is a good idea to use a rotation of assigned chore duties to be sure that every one shares equally in the tasks.

PREPARATION TO SAIL

KEY CONCEPTS TO TEACH

- Assessing a new boat and local conditions
- Planning for the following days

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Thorough check of vessel and equipment
- Safety equipment (including emergency steering): check and operation
- Check sail inventory
- Daily checks of systems

KNOWLEDGE SKILLS:

- Passage planning
- Cruising range under power

In Basic Cruising, preparing to sail was the procedure to get a boat underway. Because the scope of the course dealt with daysailing, the weather and navigation that could be readily observed was sufficient preparation for departure. Noting the wind, current, prominent landmarks and aids to navigation are sufficient for most daysailing. The daily checks introduced in Basic Cruising -- engine oil, bilge water, and voltage monitoring -- are just as important here.

In Bareboat Cruising, observation and awareness of immediate conditions remain important, and students should be reminded of that. But in Bareboat Cruising, preparation must look farther into the future, beyond the time of today's sunset -- to weather conditions day after tomorrow in a harbor 50 miles away. It is the difference between planning a day at a local beach and taking a week's cottage rental in a place you have never been.

Navigation Preparation

Much can be done ashore or on board before setting out when the navigator's attention is less distracted. Small-scale and large-scale charts and guide books can be studied to learn what to expect on daily passages, and which anchorages would be appropriate in different weather conditions or on day trips. Routes may be planned, and the latitude and longitude of way points listed as a convenient record to enter into a Loran or GPS.

Perhaps most important, the initial review of the material raises more questions for which answers can be found before being faced with a decision. For example, is the holding ground good in a certain harbor, or if you are delayed until after dark is a night approach recommended?

How To Assess an Unfamiliar Boat

The students have actually begun to learn this in Basic Cruising and every time they have been faced with a different boat. For charterers, the process should become more efficient because if the questions are not asked up front, the sailors will have to figure it out themselves or sort it out on the radio.

It is important that the students learn to go over an unfamiliar boat carefully to learn how to efficiently assess its benefits and faults. It is awkward to discover that there is only one winch handle on a boat or the windlass doesn't work. Review the Basic Cruising section in this manual for specific topics. For example, remind the students to check for good deck hand holds (which unfortunately often do not include dodgers and Biminis).

Checking out a charter boat can seem presumptuous for a novice. After all, one assumes the company is professional. However, the charterer is taking responsibility of the vessel. It is not like a hotel room where one can call to have the bathroom light replaced at midnight. While the charter company is professional, the boats are used constantly during the busy season and some things may be overlooked unintentionally. It is better for the charterer to find out at the dock that all the cooking fuel has leaked away. (A bottle the size of a wastepaper basket should weigh more like 20 pounds than 5 pounds.)

While running your students through the boat,

- Challenge them to find things to check, or
- Use a typical checklist of equipment expected on a charter boat and see if they can find and operate everything on the list. then
- Assign each student to go explain the equipment in a particular area, such as the cockpit locker, the head, navigation station, or engine compartment.

This exercise will get them to look more closely at the equipment and help you assess the knowledge that they are bringing into the course. The exercise should not be exhaustive. It should get them thinking, not bog them down in minutia.

The students should note the general condition of the boat inside and out. This gives them an idea as to the quality of maintenance and what they may have to attend to first, such as flaking the anchor line before attempting to anchor.

On deck:

- ☑ Do halyard and sheets have worn spots?
- ☑ Are docklines long enough (about six to ten feet longer than the boat)?
- ☑ Are the fenders adequate?
- ☑ Are the anchors and rodes stowed properly?
- ☑ Do the winches and sheaves turn easily?
- ☑ What is in the cockpit locker? Lazarette?
- ☑ Where are spares located?
- ☑ Is the dinghy painter adequate?
- ☑ Where are the deck fills for water and fuel and how are they labeled?

Below:

- ☑ Is the electrical distribution panel well labeled?
- ☑ Are valves for the head, fuel, and water well labeled?
- ☑ Where are the gauges and/or dipsticks for fuel and water?
- ☑ Are instruction manuals for equipment on board?
- ☑ Is the galley adequately supplied with pots, dishes, utensils, etc.
- ☑ Are there bedding and towels?
- ☑ Are there charts, essential tools and reference books?
- ☑ Is the emergency gear in order?

TEACHING TIP...
Remember, the students have come to sail. You must make that a priority of your lesson plan while instilling the importance of doing the practical checks. If checking out the boat takes too long and you are losing the attention of some, take a break, or jump to getting underway. This information can be worked in at other times. The checklists are good handouts to which the students can add notes and refer later.

✓ **EQUIPMENT CHECKLIST...**

- ☐ Proper charts (small and large scale)
- ☐ Cruising guide book of the area
- ☐ 7x50 binoculars
- ☐ Pencils, dividers and parallel rules
- ☐ Logbook, tide table
- ☐ Book on Navigation Rules
- ☐ Instruction manuals for electronics, radio, engine and other equipment
- ☐ Tools: sharp rigging knife, screw drivers, wrenches, locking pliers, etc.
- ☐ Spare parts
- ☐ Manufacturers' manuals
- ☐ Also useful: rigging tape, seizing wire, light line
- ☐ Two proper sized anchors
- ☐ Anchor rodes and adequate docklines
- ☐ Dinghy, outboard with fuel and oil, and oars
- ☐ PFDs, flares, fog horn, bell
- ☐ First aid kit
- ☐ Flashlight and extra batteries
- ☐ Adequate fuel
- ☐ Deck plate key

✓ **ADDITIONAL EQUIPMENT CHECKLIST...**

(Good for cruising, but not expected when chartering)

- ☐ Extra jib sheet (can be used as boom preventer as well)
- ☐ Extra shackles
- ☐ Engine belts and gaskets
- ☐ Fuel filters and oil filters
- ☐ Extra motor oil and transmission fluid
- ☐ Household lubricating oil
- ☐ Safety harnesses, jacklines
- ☐ Bosun's chair
- ☐ Small anchor (lunch hook) with rode

GETTING UNDERWAY

KEY CONCEPTS TO TEACH

- Assessing wind and current effects on boats
- Organizing crew teamwork

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Securing dinghy
- Departure under power in upwind, crosswind, and downwind conditions

Many people mistakenly think that getting a boat out of a slip or off of a dock is as easy as unparking a car. In ideal conditions, it is easy. In normal conditions, it requires skill, and in difficult conditions, the helmsman needs all the help he or she can get.

Getting off and onto docks in crosswinds, current, and tight spaces requires practice. Since this is an area where many students have uncertainties, ask them to explain the different considerations. Gently correct errors, and reinforce well expressed descriptions. Then have them practice at every opportunity throughout the course.

TEACHING TIP...
Practice approaching and leaving docks or slips:

- With wind on stern
- Crosswind -- blowing on or off the dock
- Bow first
- Stern first

- Allot plenty of time in the course to practice. If possible, alter the conditions each time.
- Review with your students the illustrations in Basic Cruising, "Leaving the Dock," to refresh their memories about techniques for handling various conditions with the engine and spring lines.
- Review prop walk and explain the engine controls of the boat you are on.
- Point out that part of the decision of how to approach a dock is how easy it will be to leave.

✓ REMINDER FOR YOUR STUDENTS...

- At slow speeds in reverse, bow tends to follow stern.
- At slow speeds in forward, bow tends to fall to leeward.

The first practice can be to make a point of going to another dock for water or fuel before departure. This also would be a good time to teach how to fill fuel tanks.

The acting skipper should explain his or her assessment of conditions and decide on a plan with or without the input of other students. Then assign duties to each crew.

If students come up with a safe way to do it, let them proceed. You can suggest improvements, when you review how the procedure went.

Emphasize to proceed at slow boat speed.

✓ **HOT TIPS FOR YOUR STUDENTS...**

- The crew should sit or stand on centerline unless actively working so that the helmsman has a clear view.
- If the dinghy is in the water, it should be on a short painter or tied off along the boat's quarter. When the boat is in clear water, the dinghy can be towed as normal.

If something is not working, encourage them to pause if possible and reconsider rather than press on. This can also be helpful when trying to approach a dock. If the boat is not lining up right, they should be encouraged to try again.

To keep the other students occupied while the helmsman does most of the work, suggest to them that they try to anticipate what the boat will do with each action of the helm and engine controls. They can be testing themselves instead of standing around.

Suggestion: As the students become less nervous about taking charge, have each give directions and also commentary on why the direction was given. There are two reasons for this: the instructor can evaluate thought process, and other students may see the benefits or flaws in the plan for later discussion.

SAILING SKILLS

KEY CONCEPTS TO TEACH

- Sails must be adjusted to conditions

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Crew indoctrination and responsibilities
- Engine failure recovery in crowded harbor

Basic sailing skills of steering, sail trim, communication, and safe behavior should be approaching second nature. The instructor needs to encourage the students to refine their skills and techniques for smoothness and consistency. The helmsman (not the instructor) should always give an alert for an upcoming maneuver, wait for a "ready" response from the crew and provide any further details as needed. The crew should be able to anticipate the sequence of events following that alert, such as doing a Quick-Stop maneuver without a string of orders being given.

An example of proficiency (and good teamwork) is a helmsman who tacks the boat to ease the job of the trimmers by not tacking through too quickly or falling off beyond close-hauled while the genoa is being cranked in for beating. This effort needed by the latter may be pointed out as the philosophical difference between cruising and racing. (If this happens consistently, the helmsman should be relegated to jib trimming for a demonstration of being on the receiving end.)

The instructor's role here focuses on refinement of skills and evaluation by pushing each student a bit further than they are comfortable. You should be alert to misinterpretations and bad habits that the students may have picked up. Try exercises that deprive students of their most common crutches:

- Cover the wind instruments and see if the students still know where the wind is coming from.
- Sail without all instruments for a day. (Have a lead line with you.)
- Blindfold each helmsman when beating to see if he or she can <u>feel</u> the boat and helm, and respond to pinching or footing.
- Forbid everyone from speaking and privately tell the helmsman to execute a series of maneuvers -- like two tacks and a jibe then coming up on a reach and tacking once more -- to see if the crew can interpret actions and hand signals and trim the sail appropriately.

- See if the crew can figure out how to sail backward in light air. (You may give them the tip that rolling up or dropping the jib will probably help.)

The students will find that these situations are not as contrived as they seem when they find themselves sailing in the dark, or it is blowing too hard to hear well, or some fuse has blown, or they need to set an anchor under mainsail.

Additional useful sailing techniques for cruisers are covered below.

Tacking Downwind. As cruisers take on sailing greater distances, comfort becomes more important. A boat that is rolling and pitching with the jib uselessly blanketed by the main while running before the wind in a moderate seaway is tolerable for a short time, but given searoom, tacking downwind is preferred. Broad reaching at about 140 to 150° apparent wind angle should put the waves on the quarter and makes steering easier. If conditions allow, let your students prove this for themselves.

The added distance is made up by the faster sailing angle. This is the same reason why racing boats -- even under spinnaker -- carefully figure the best angles for tacking down wind (in all but heavy air when a spinnaker run is fastest).

Poling Out the Jib. Another option for downwind cruising is to use a spinnaker pole or whisker pole to hold the clew of the jib to windward (opposite the boom). This can be a delightful rig for sailing a long leg where the winds are consistent, such as in the trade winds. The simplest arrangement:

- Attach the pole to the track or a pad eye on the mast about four or six feet off the deck.
- Hook the topping lift to the outboard end of the pole and run the windward jib sheet through the end of the pole.
- Raise the topping lift until the pole is level.
- As the windward sheet is trimmed and the leeward sheet is eased off accordingly, the pole is pulled aft with the clew until the jib has a full even spread without too much "bag" forward of the headstay.

A Couple of Warnings. Do not let the leeward sheet run, or the jib may stream out forward of the headstay and, possibly wrap itself around the headstay. Secondly, the poling-out rig takes the same amount of time and care to unrig as to rig, which may leave a sailor scrambling if a ship or squall is sighted on an intercepting course.

A Better Rig. Although it takes a little more time to set up, this is more versatile for shorthanded cruising. The pole and windward sheet are set up as before but the pole is also rigged with an afterguy and a foreguy (pole downhaul). The afterguy is led from the outer end of the pole to a snatch block on the windward rail at about maximum beam, then to the secondary winch. The foreguy runs from the outer end of the pole to a snatch block on foredeck and to a cleat or leeward winch in the cockpit. The pole can now be positioned independently of the jib, then the windward jib sheet is trimmed through its lead at the pole end.

If the boat needs to change course or the wind swings around, simply let the jib cross back to leeward. With the pole secured by guys, it will not swing around, and the crew can deal with it in due course.

One More Tip. Some jibs work better for poling out than others. A high cut 110 to 130% genoa works well. The clews of deck-sweeping jibs are too low, and 150% genoas have too much sail area to set well. (See the jib section on the next page.)

RIGS AND SAILS

KEY CONCEPTS TO TEACH

- Sail selection and trim is often a compromise
- Power and balance control

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Sail selection

KNOWLEDGE SKILLS:

- Sail selection
- Going aloft safely

While the vast majority of moderate sized cruising boats are sloops, variations in rigs and types of sails illustrates that there is no one conclusive way to do anything in sailing. Comparisons help the students recognize the compromises that they are dealing with on any given boat.

Jibs

Nowadays, a production cruising boat commonly is fitted with a 130% roller furling jib.

A Roller Furling Jib. Provides good drive and fairly good pointing ability, disappears with the pull of a string, and is wonderfully convenient for most cruising.

- The clew is high cut which allows the crew to see under it to leeward, but also means that when furled, the sheets are out of reach above the foredeck.
- The leech and foot of the sail should have a sacrificial panel of acrylic cloth which serves as a sail cover when the sail is furled to protect against UV degradation of the Dacron sail cloth.

DEFINITION...
The 130% (or 110% or 150%) is the ratio between the length of a straight line perpendicular to the jib luff drawn through the jib clew and the length of a horizontal line drawn from the base of the head stay to the front of the mast.

- The jib has a luff tape that fits within a slotted extrusion around the headstay, which provides a smooth surface and even rolling when the sail is reefed.

Roller furling has a few disadvantages:

- The roller furling mechanism needs periodic maintenance. If it binds up, the sail may be caught part way in or out and a crew member may have to go aloft to analyze and solve the problem.
- Using the sail in a partially reefed mode can put an uneven strain on the sail. In addition, decreasing the size of a roller furling sail moves the center of effort forward and higher. As the main is reefed also, thus moving its center of effort forward, the boat may develop leeward helm which makes steering difficult.
- To change a roller furling jib, it must be fully unfurled which is a nuisance in a boat slip with a cross breeze and can get uncomfortable in heavy weather when a 130% jib becomes a flailing menace.

Jibs and Genoas. Racing boats use a variety of jibs and genoas (a genoa generally means any overlapping jib) to maximize performance over a range of conditions by optimizing shape and stress loads with a variety of synthetic fibers and films such as Kelvar, Spectra, and Mylar. They commonly use an extruded headstay with twin grooves to allow the setting of the new jib before the old jib is doused.

The Grooved Headstay. Allows for efficient sail changes with a full complement of racing crew, but a potential danger arises when these sails are on deck and therefore not secured to the headstay. Wind can catch the folds or waves can fill the doused sail with water and drag it over the side. Race boats often have webbing between the lifelines to help restrain the sail on deck. This hazard makes these sails less desirable for shorthanded cruising boats.

Hanked Jibs. Many smaller keelboats and traditional cruising boats -- as well as shorthanded cruisers -- use jibs with hanks to securely connect the luff of the jib to the headstay even when the halyard is allowed to run. That advantage outweighs the fact that sail changes are slower and there is a bit more turbulence in air flow.

Jib Leads. Modern sailboats have tracks with moveable leads on the side decks -- or in some cases along the cabin top. In order to trim the jib evenly the jib sheet must pull the clew at a proper angle. The line of the angle runs from about 60% up the jib luff from the tack down through the clew. The size of the jib and the height of the clew above the deck are the factors which influence the position of the car. A high cut jib needs a sheet lead farther aft than a deck sweeping jib of the same size.

For close-hauled sailing, the jib leads can be further refined by observing the jib telltales. Normally, the windward telltales break if the boat is pointed too high (pinching) or if the sail needs to be trimmed more. Once the sail is trimmed completely, uneven breaking of the telltales can be used to indicate twist in the sail which can be removed by adjusting the jib lead.

- If the top and bottom telltales break at the same time, the jib lead is correct.
- If the top windward telltale breaks before the lower telltales, the jib lead is too far aft. The sheet angle is flatter and is pulling more along the foot of the jib which allows the top to be fuller and luff earlier.
- If the bottom windward telltale breaks first, the jib lead is too far forward -- the sheet angle is pulling more from the top of the sail and allows the lower part of the sail to be too full.

All of this can be demonstrated and experimented with by the students more effectively than it can be lectured about. Be careful to warn the students that when the sheet is under pressure, the car may be dangerous to move. If a crew member manages to lift the restraining pin, the car will be forced aft rapidly by the upward strain on the forward side. Injury to boat gear or human parts is likely to occur. The better method is to change the lead of the lazy sheet on the windward side of the boat and tack over onto the new lead. Then show the effect of the change.

For reaching, the jib will set better if the lead is moved outboard to the rail which opens the slot behind the eased mainsail. For close reaching the telltales can be used the same way, but there is a point beyond beam reaching where the top of the sail will twist off, and proper jib trim becomes an average of the telltales.

From broad reaching to running, a jib sheeted on the leeward side is completely blanketed and is ineffective. There are two possible solutions. One is to sail at a reaching angle at which the jib will fill well. This generally puts the seas at a better angle to dampen rolling and lessen a chance of an accidental jibe. The other is to pole out the jib to weather as described earlier.

Cruising boats may be rigged as cutters with the mast stepped farther aft and an inner forestay to the center of the foredeck. This is a versatile rig that allows the use of a staysail to supplement the jib when reaching, and the inner forestay is a secure location for a storm jib to be hanked on if foul weather is anticipated.

Mainsails

Mainsails have received more attention in recent years to make them easier to handle and more efficient as the primary "power" sail of the boat. The old IOR racing rule gave undue advantage to high aspect mainsails with short booms and tall rigs. Many production boats followed the trend to appear more "racy." The current trend is toward larger mains and smaller jibs which, for a cruising sailor, means that a boat can carry enough sail area in light winds without the nuisance of having to tack a large genoa. In heavier air, the cruising sailor can quickly reef the main and keep effective sail shape and balance without changing headsails or roller reefing the jib with the attendant disadvantages mentioned above.

The power and effect of the mainsail needs to be appreciated by every good sailor. Not only is the mainsail the medium by which wind energy translates into boat speed, but it affects (and sometimes controls) steering. A good sailor learns to feel the interaction of the power and the balance exerted by the mainsail.

Power and Balance. The interaction of power and balance should be repeatedly demonstrated and reinforced with students. The sailor who does not appreciate how to manipulate the mainsail will make sailing hard on him or herself and the crew. Some people like the feel of fighting a lot helm. In reality the work is counterproductive. All the force that goes into making a boat difficult to steer is not helping the boat go forward.

Traveler. The traveler is referred to by some performance sailors as the "gas pedal" because on points of sail from a beat to a beam reach, a properly rigged traveler -- one that is easy to reach and adjust under load -- is the easiest way of powering up or powering down the main, which is especially useful to cruisers in gusty conditions. By moving the traveler up or down the track, less or more wind will be spilled from the main, yet the shape of the sail is not changed as much as in easing the sheet and the desired course can be maintained.

In the gusts with the traveler eased, the luff of the sail will backwind and a "bubble" will develop. The after half of the sail will provide reduced drive and the helm will be easier. If the traveler is played properly, the heel of the boat will be controlled better as well, which may be a consideration to students and, later on, to their family and friends who are leery of tippy boats.

TEACHING TIP... A POWER & BALANCE DRILL

In medium to heavy air with a full main, have a student steer on the wind with the sails strapped in tight.

1) Review "weather helm" and demonstrate the effect of easing the main sheet or the traveler.
2) With the main still trimmed and a point of reference for course change, ask the helmsman to head off to a reach and note the strain on the steering.
3) Then, repeat and ease the main with the maneuver. Some boats will fall off more easily and some, especially with short fin keels and small rudders, will not fall off at all with the main trimmed in -- a common cause of port/starboard collisions for n inexperienced cruiser/racer.

TEACHING TIP...

Playing the traveler (or the sheet in lieu of a proper traveler) gives the students important control over the power of the sail and clearly illustrates the changing feel and balance of the boat that becomes second nature to a good sailor.

Boom Vangs, Toppinglifts, and Preventers. Are used to stabilize booms. They are beneficial both to safety and sail shape.

Boom Toppinglift. A main toppinglift runs from the after end of the boom to the masthead. On cruising boats, the tail is led down the mast to be easily adjusted at a cleat. The toppinglift holds the boom up when the main is not set and when the halyard is being raised or lowered at the beginning and end of a sail or when reefing and unreefing. When sailing, the toppinglift must be eased to allow the sail to take the weight of the boom; otherwise trimming the main sheet could break the toppinglift.

Boom Vang. Boom vangs primarily prevent the boom from raising too high (and possibly catching on the backstay) when reaching and running. Tension on the vang provides better sail shape and can keep the main from falling against the shrouds and spreaders thereby reducing chafe.

Traditional vangs may be made up of a multi-part block and tackle from a bail under the forward part of the boom to a bale on the mast near the deck. Rigid vangs are increasing popular. They use either a hydraulic cylinder or a spring loaded compressible tube with a block and tackle. The major advantage of a rigid type vang is that it can hold the boom up and well as down, eliminating the need for a toppinglift.

A vang should have a steep angle between the mast and the boom. At a shallow or flat angle, the major force is pulling forward not down, and can lead to severe strain on the gooseneck.

TEACHING TIPS...
Vang use can be easily demonstrated to the students. If the main has telltales on the leech, the effect of the vang on efficient sail shape can also be demonstrated. Too much vang when reaching can stall the leeward side of the main and suck the telltales around to that side. Too little vang causes the leech to twist off and the sail to luff toward the top. Throughout the course remind the main sheet trimmer that he or she should work with the vang as well as the sheet and traveler.

Preventers. Are related to vangs in that they control the movement of the boom, but a preventer is a line or tackle rigged to keep the boom from swinging across the boat. It should be rigged well forward and/or outboard of the boom position and tightened sufficiently that the boom can not accelerate if the main is caught aback in an accidental jibe or roll.

> **NAUTICAL TERMS...**
> A difference between English and American terms: In England, a vang is called a kicking strap, and a preventer is called a vang.

Preventers may be:

- A strong, low-stretch length of line like a jib sheet attached to the main sheet bail on the boom to a snatch block on the rail near the shrouds and back to a cockpit winch, or it may be led through a chock on the foredeck.
- A block and tackle of four- or five-part purchase with a self contained cam cleat which can cover a ten to twelve foot distance between the boom and the rail.

Reefing. Reefing should be practiced and used regularly when the wind pipes up. It should be considered a normal procedure, not something just for storms. In some popular charter areas such as Hawaii and the Caribbean, your students may find that they are more comfortable sailing with a reef all the time.

"Jiffy" or "slab" reefing was covered in the Basic Cruising section under "Reefing," but for prolonged reefing, it is wise to show the use of reef points.

Reef Points. Are light lines or sail ties that are used to tie up the "slab" of a reefed sail so that it does not hang down from the boom.

If the main has slides along the foot, the reef points should be passed through the grommets along the reef and between the foot of the sail and the boom, then tied loosely with a reef knot. If the main is attached by a bolt rope to a groove in the boom, the points will have to reach around the boom, but again should be loose. The sail is not reinforced sufficiently at the grommets to take much strain, and the sail could rip.

Leech Lines. Are devices on both the main and jib which cruising sailors are often accused of ignoring. Fluttering leeches betray sloppy sailors, and shorten the life of sails. Leech lines should be tightened just enough to stop the fluttering. In lighter winds, the tightened line may cause the leech to hook in and would need to be loosened again.

Battens. Allow the sail area of the mainsail to extend beyond the hypotenuse of a basic triangle. This portion of the sail, the roach, provides a significant amount of drive, and the battens keep the sail from falling in on itself.

The extremes of mainsail cut can be pointed out to students. A mainsail that rolls up in the mast has no battens and little or no roach. The design trades off convenience of sail handling for reduced performance. Fully battened sails, common on multihulls can increase sail area by a third or more. Even on cruising boats, full battens are gaining favor, but they do need to fit properly to prevent chafe and to allow the sail to invert easily when tacking in light air. For most monohulls, the increase in roach is limited by the interference of the backstay.

Furling or Flaking a Mainsail. To furl or flake a mainsail depends on the age and material of the sail. Furling stuffs the sail cloth within a fold created by the foot of the sail. It is relatively quick and easy, but shortens the life of sized or laminated materials. (Some charter boat companies expect mains to be furled.) Flaking is more time consuming and takes a bit of care to get a tidy appearance and to make sure the battens are not bent over the boom, but the sail will last longer in good shape. In either case, a sail cover is essential to prevent ultra-violet light from degrading the sail cloth.

Mizzens

Mizzens are found on yawls and ketches, both of which are relatively rare these days in production boats. The smaller mast aft provides versatility in sail use and reduces the sizes of individual sails while maintaining total sail area. The mizzen is especially useful when reaching. In heavy weather, sailing with "jib and jigger" (jib and mizzen sail set with the main furled) can balance a yawl or ketch very nicely.

Going Aloft

On every cruising boat, there comes a time when something needs attention "up there." Going aloft should become a regular practice for an experienced cruising sailor; albeit, one that is always done with care. Some of the reasons include:

- Retrieving an errant halyard, topping lift or flag halyard.
- Removing a toy kite from the VHF antenna.
- Replacing bulbs in navigation lights.
- Unjamming roller reefing.
- Taking (nearly aerial) photographs.
- Checking wear and condition of halyard sheaves, spreaders, and stays.

Choose daylight and flat water for going up the mast. Impress this on your students. Even a launch passing regularly in a quiet anchorage can make changing a light bulb a bruising experience.

A good bosun's chair securely holds the person in it with straps around the waist and through the legs. Some chairs have rigid seats, and some are more like climbing harnesses. Preferences vary. In addition, some people prefer chairs with built-in pockets, and others prefer a separate canvas bucket which can be lowered for additional equipment or supplies.

The following are basic safety procedures that should be observed:

- The D-rings on the chair may be connected to the spliced eye of a halyard with a shackle or carabiner, which screws shut, or a halyard may be tied to the rings with a bowline. If available, a second halyard can be attached as a safety line.
- *Do not rely on the snap shackle* of the halyard to hold a human being.
- It may be useful for the person going aloft to have a long sail tie to loop around the mast or stay as a restraining line which frees up a hand for working.
- Preferably, take the halyard with a fair lead to a primary cockpit winch or to an anchor windlass. The hoisting will be easier on the person on deck and the remote lead moves crew members out from under the person and tools going aloft.
- Preferably, do not use self-tailers on winches, but if you do, watch them constantly. When the person aloft is at the right height, *cleat the halyard* and safety line securely.
- *Do not stand underneath someone up the mast.* Needle-nosed pliers can penetrate a quarter inch of solid teak when dropped from the masthead of a 50-footer.
- *Lower the person smoothly* by easing the halyard off the winch with just enough turns (probably three or four) to overcome the friction of the drum. Watch the person coming down and slow the descent when the person has to climb around spreaders or rigging.

NAVIGATION RULES

KEY CONCEPTS TO TEACH

- Rules evolved for safety reasons
- Knowing what another vessel is going to do

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Application of Navigation Rules

The prospect of discussing Navigation Rules -- what used to be called "rules of the road" -- can cause students' (and instructors') minds to glaze over, expecting a force-feeding of details such as, the difference in meaning between one black ball in the rigging and two or three vertical black balls.*

Navigation Rules evolved for safety reasons to give vessels a chance to see and understand the intentions and capabilities of others (dinghies, fishing trawlers, hovercraft, or tankers) they come close to. As Thucydides said, "A collision at sea can ruin your whole day."

Every mariner should know the meanings and requirements of:

- A proper lookout (Rule 5)
- Safe speed (Rule 6)
- Risk of collision (Rule 7)
- Action to avoid collision (Rule 8)
- Conduct of sailing vessels (Rule 12)
- Overtaking, head-on and crossing situations (rules 13-19)

✓ **SAFETY TIP FOR YOUR STUDENTS...**
Recognize a constant bearing as a warning signal for an impending collision.

The other rules are important as well. There is a lot of common sense that has be codified into law and sailboats are bound to it just as much as ore carriers are.

A cruising sailor who is ignorant of the rules is a danger to his or her boat and crew. A copy of the complete Navigation Rules published by the Coast Guard should be on every boat and is required on boats over 39.4 feet..

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* One black ball in the rigging is the day shape for "vessel anchored." Two vertical black balls are for "vessel not under command." Three balls are for "vessel aground."

But why do recreational sailors need to know the sound signals between ships?

Because the knowledge gives the sailor a clue as to how to stay out of the way. Today two ships may decide how to pass by communicating on VHF radio Channel 13, but they still tend to say things like "One blast, Captain."

One short blast refers to Rule 34, "Maneuvering and Warning Signals." If a sailboat has the two ships in sight, what will happen? The answer, like much in navigation, is "that depends:"

- If the ships are in COLREG waters, one ship will alter its course to starboard. (Show your students the COLREG lines at the entrance to inland bodies of water that divide the U.S. rules from the international rules.)
- If the ships are in Inland Waters of the U.S., one short blast means the ship intends to leave the other ship on the first ship's port side. If the second ship concurs, it would answer with the same signal: one short blast.

Why are there Inland Rules?

Tradition. Different rules develop in different regions of the U.S. as transportation expanded on the internal waterways of the country. Only recently were the rules consolidated into one set of Inland Rules which are similar but not completely identical to International Rules -- known as 72 COLREGS since the 1972 Convention on the International Regulations for Preventing Collisions at Sea.

Because cruising sailors tend to travel or charter boats in other areas, it is important for them to know that the rules vary and that lights on a tug and barge in the Straits of Florida will be different from those on San Francisco Bay.

Sound Signals

Sound Signals for Passing	International	Inland
1 short blast	I am altering my course to starboard	I intend to leave you on my port side (I agree with your intention)
2 short blasts	I am altering my course to port	I intend to leave you on my starboard side (I agree with your intention)
3 short blasts	I am operating astern propulsion	I am operating astern propulsion

Sound Signals for Overtaking	International	Inland
2 prolonged blasts and 1 short blast	I intend to overtake you on your starboard side	
2 prolonged blasts and 2 short blasts	I intend to overtake you on your port side	
1 prolonged, 1 short, 1 prolonged, 1 short	(I agree with your intention)	
1 short blast		I intend to overtake you on your starboard side (I agree with your intention)
2 short blasts		I intend to overtake you on your port side (I agree with your intention)

There are three sound signals that a sailboat is likely to use or need to respond to:

- **5 or more short and rapid blasts** -- the danger signal -- means that a "vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision." A sailboat that ventures too close (within several hundred yards) to the path of a ship may well hear this signal.
- **1 prolonged blast every 2 minutes** means a power-driven vessel underway in or near an area of restricted visibility. Restricted visibility means "fog, mist, falling snow, heavy rainstorms, sandstorms or any similar causes."
- **1 prolonged blast and 2 short blasts every 2 minutes** means a sailboat underway with sails alone in or near an area of restricted visibility. The signal also means a vessel not under command, a vessel restricted in her ability to maneuver, a vessel engaged in fishing, and a vessel engaged in towing or pushing another vessel.

Navigation Lights

The lights on a vessel indicate some things about its size and activity between sunset and sunrise and during restricted visibility. The more that your students learn about the specific lights the better they will be able to interpret some of the confusing combinations that may be seen.

In book illustrations of navigation lights, the vessels never have their decks glowing with work lights as real fishing boats or tugs often do. In addition for the coastal sailor, ships and other boats can often blend in with shore lights unless a lookout is very careful. A red light may be a port running light, or a navigational aid, or a traffic light.

How would your students interpret a green light with two vertical white lights above it and a row of yellow lights underneath?

A tug with its work lights may be seen, but the running light of its barge, a hundred meters astern, may be obscured by the lights of a town. Unless the lookout knows what the two or three vertical masthead lights mean a vessel towing astern, the helmsman may try to pass astern of the tug.

Lights on Sailboats. A combination stern light and side lights, known as a "tricolor," at the top of the mast may be used on sailboats under 20 meters (65.6 ft) in length under sail. However, when powering, running lights must be below the masthead light, which is usually part way up the forward side of the mast; therefore, the sailboat under power must use side lights and a stern light near deck level.

Extra credit questions:

1) What does a black cone apex down mean?
2) What does a red 360° light over a green 360° light mean?*

Proper Term	Also Known As
Masthead Light	Steaming Light Bow Light
Sidelights	Running Lights Navigation Lights
Anchor Light	Masthead Light

* 1) The day shape for motorsailing. 2) The optional lights for a sailing vessel underway.

NIGHT SAILING

KEY CONCEPTS TO TEACH

- Using senses other than sight
- Using what light there is

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Interpreting lights from ships and navigation aids
- Overboard recovery at night

KNOWLEDGE SKILLS:

- Seamanship skills sharpen by night sailing

Note to Instructors: Although night sailing is not part of the Bareboat Cruising Certification requirements for students, instructors are expected to have a higher level of skills and knowledge than the students.

Night sailing is great fun but also introduces new challenges. Night sailing is a good way to teach the value of standard procedures for simplicity and safety. For example, if the main needs a reef at midnight, the drill will go better if the halyard has been secured and coiled in the expected way.

Small flashlights are very handy for each crew member to have, but the use should be judicious. Night sailing is a good time to learn to appreciate the use of different senses when in daylight you would rely on sight -- hearing the jib leech fluttering, smelling a fishing boat to weather, feeling the wind direction on your neck. It is also important to realize how much can be seen when your eyes have adapted to the dark, and how easily night vision is destroyed by the glare of a flashlight or a cabin light blazing below.

✓ **HOT TIP FOR YOUR STUDENTS...**
When "scanning" a dark horizon at night for unlighted land or the faint lights of ships just appearing, center your sight about "an inch" or 5° to 10° above the horizon and take a series of overlapping "snap shots." Your peripheral vision picks up dim images better.

Students should be able to tack and jibe without deck lights. They will recognize once again the need for preparation, communication, and teamwork. They should be expected to tie knots in the dark. All basic procedures should require a minimum of artificial light, and flashlight will normally do when light is needed.

If the deck floods have been turned on (unnecessarily) to drop and flake the main, the helmsman is at a distinct disadvantage steering among boats in a dark anchorage. Either he or she won't be able to see beyond the pool of light or if the lights are turned off again, it may take a full 10 to 15 minutes to regain night vision.

Night steering is easier than many novices suppose because the helmsman does indeed have references off the boat on all but the murkiest nights. A star that sits just off the spreader when on course can be used for some time until it moves too far out of line. A cloud bank on the horizon also can be a temporary reference. It is of the utmost importance not to let the helmsman stay glued to the compass: *They will oversteer* as they try to follow the swinging compass card. Remind them to use the compass as a reference not as the primary steering guide.

The Coastal Navigation section covers night navigation in detail, but a few points are worth repeating here.

Navigation lights and lighted aids to navigation are the boon and bane of sailors. The warm glow of a long expected lighthouse is pure joy. Sorting out flashing channel buoys and the intentions of a tug and barge against an urban confusion of lights remains a trial for the most skilled sailor. Distances are hard to determine at night, and some situations can be read at least two ways. The sailor must learn to use all the navigation skills that seem redundant in daylight.

- Radar answers many questions.
- Shining a spotlight on a buoy to make a positive ID is most useful. (Just make sure there is not another "R2" nearby on the chart.)
- Using a lighted range is one of the best ways to line up a channel.
- Two or three crossing bearings can fix a position adequately.
- Depth contours can double check your fix.

Instill in your students that if they have any doubt, they should slow down, think it through carefully, and if necessary rework their DR from the last fix while factoring in current leeway and possible lax steering. Errors in navigation at night can be caused by a confusion of lights, or they can be caused by plain fatigue. Three in the morning is not the best time for most sailors to puzzle out a conundrum. (We want our DR to be right even if the characteristics of the light

don't agree with the chart. We could even convince ourselves that the light must have been changed.) If a late arrival is anticipated, it may be a good idea for the navigator to take a nap earlier in the day.

A sign of a good instructor is someone who can promote good crew work where everyone's strengths are used and faults are compensated for, yet that instructor can still see through the joint effort and instruct the individuals to their greatest benefit.

Overboard recovery at night is a very scary prospect, but practice helps. The same procedures are used as in daylight, and if the students learn to do pick-ups of inanimate floating objects at night, daylight recoveries will seem easy by comparison.

Strobes are useful to locate victims, but should be turned off when the victim can be seen, otherwise they affect the vision of the helmsman, and may even induce vertigo.

✓ **SAFETY TIP...**
The wearing and use of a safety harness at night should be required for everyone on deck..

✎ **TEACHING TIP...**
Because successful completion of this course earns a skipper's certification at the level of bareboat chartering, part of the instructor's evaluation must be to assess how well each potential skipper can take responsibility and get the crew to perform as needed. The instructor may choose to assign exercises to each student. The student must consider the alternatives and decide on a plan based on the strengths and limitations of the boat and the crew. The plan must be clearly explained and, if necessary, a back-up plan also explained. Then the student must follow through on the plan. Topics could include getting underway, setting sail, shortening sail, boathandling under power, anchoring, and dock landings.

ANCHORING

KEY CONCEPTS TO TEACH

- Anchoring needs planning and watchfulness

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Anchoring under power with two anchors
- Retrieving anchors under power
- Use of trip line
- Picking up a mooring

KNOWLEDGE SKILLS:

- Anchoring with two anchors under power and sail
- Clearing crossed anchors
- Recovery situations

It would be well for a sailor to remember that an anchor is the symbol for "hope." As with any hopeful venture, anchoring tends to have better outcomes when planned and overseen carefully. Anchoring should also be viewed as temporary and likely to need adjustment. Only a foolish sailor would drop the hook in an unfamiliar spot then let the entire crew vacate the boat for the afternoon or evening. The anchor may symbolize hope, but anchoring requires skill and vigilance.

Anchoring is given a good deal of space in this manual because much of the material may be new to the students and since a third to a half of a cruise may be at anchor, successful anchoring will make any cruise more enjoyable.

Where To Anchor

Use a chart to discuss options. Consider the weather forecast for the period of anchoring: lunch, overnight, several days. The longer the stay and the more unpredictable the weather, the more a protected location is needed. Then choose the best combination of the following:

- A site in the lee of land or a breakwater.
- Water depth that is safe over a full range of tide and over the full swing of the anchor circle. Deeper water means a longer rode (5 to 7 more feet for every 1 foot of depth) and a bigger swinging circle.

- Bottom consistency that will hold an anchor well -- sand or mud that is not too thin or soft is ideal.
- Space to swing among other boats. Note that boats on chain rodes describe smaller circles than those on rope rodes.

Where Not To Anchor

When discussing this find examples on a chart:

- In a channel
- In a cable area
- Among moorings
- On a coral reef (a single dragging anchor can break up a century of coral growth.)

Anchors

Boats should carry at least two anchors of different types that are adequately sized for normal to bad conditions.

- Cruising sailors often carry a lightweight anchor (like a Danforth) and a plow-type anchor. Each should have its own rode of ample length. If rope rode is used then each should have 8 to 12 feet of chain as well.
- A "lunch hook" is handy for brief stops like a meal or a swim. A lunch hook is simply an anchor that weighs 1/3 to 1/2 of the normal size for the boat so that it is easy to handle.
- For the worst conditions, a well-outfitted boat carries a storm anchor as well.

Rodes

In the U.S., rope rodes are more common on smaller cruising boats.

- The rode should be made of nylon -- the stretchiness dampens shock loading of waves and gusts.
- Rope rode are lighter, easier to stow, and can be handled without a windlass.
- The length of the rode should be marked at regular intervals to tell easily how much scope has been let out. If it is not marked, before anchoring flake out the rode in 6 foot (one fathom) lengths and count them as the rode is paid out.

- One end of the rope rode should have a splice around a thimble to be shackled to the length of chain. The thimble reduces chafe. At each end of the chain, the shackle pin should secured to the shackle with seizing wire to prevent it from working loose.

In Europe, chain is more common because of the depth of water, currents, and crowded harbors.

- Chain use is greatly facilitated by a bow roller and windlass, either manual or power-driven. Use a gypsy claw with nylon to help absorb shock.

Anchoring

If a popular destination has been chosen, plan to arrive early to find a good spot.

- Carefully consider where the boat will end up after the anchor is dropped and the rode is paid out.
- Have the anchor and rode ready to run. An adequate length of rode should be flaked out in lengths away from feet and obstructions. Tie the bitter end of the rode to a cleat for safety. Make sure shackle pins are seized.
- Make sure crew at both ends of the boat know the plan. Arrange hand signals to guide helmsman.

✓ HOT TIP FOR YOUR STUDENTS...
If anchor is not on a bow roller, it is easier to lead the rope rode through the bow chock and over the pulpit before shackling on the chain and anchor than to try to pass the anchor under the pulpit.

Anchoring Under Sail. Anchoring under sail should be practiced so that it will not seem like an emergency procedure when the engine has quit. Learning to anchor under sail is easier on smaller keel boats, but with enough prepared people a bigger boat will do. Practice where there is good holding ground, plenty of room to maneuver, and boats are lying to the wind. Anchoring with the mainsail can prove to be a problem if boats are lying with the current in a crosswind.

Procedure Under Mainsail Alone:

1) Approach anchoring spot as one would approach a mooring -- from leeward and losing forward way at the spot.
2) Drop the anchor and hold the boom all-the-way out to sail the boat backward and steering in reverse. If the bow starts to fall off, the rode may be snubbed gently to straighten the bow into the wind.
3) After enough rode is paid out, the anchor will set with the momentum of the boat when the anchor is finally snubbed.
4) If the anchor drags, be prepared to recover it and sail away cleanly.

In some conditions there is enough windage of the boat to settle back on the anchor with the mainsail strapped amidship and luffing. Once again if the bow starts to fall off, snubbing the rode should bring it back to windward.

Two Procedures Under Jib Alone:

Different boats behave differently under jib alone. A few have very little drive or balance. Experiment to learn how the boat handles under jib alone before trying to anchor.

- Proceed as above but realize that anchoring from leeward with a jib may not provide enough force to dig in an anchor.
- Here is an alternative (described by Tom Cunliffe in *Cunliffe on Cruising*). With just enough jib set to sail downwind at a controlled speed, approach from upwind and drop the anchor as the boat passes the anchoring spot. Pay out the rode to a sufficient scope as the boat continues downwind. Snub the rode and the boat should swing around and dig in the anchor as it come to rest.

Taking Bearings. Have your students develop the habit of take bearings on landmarks across the steering compass or with a hand-bearing compass to get a fix on the anchored position. The helmsman can do this while backing down to set the anchor.

- Ranges formed by landmarks at some distance also work well.
- Realize that the boat position will move somewhat even with the anchor set -- it will swing with breeze or current and it will ride up on the anchor in calms and settle back in gusts.
- It will be helpful if the landmarks show up at night.

✓ **HOT TIP FOR YOUR STUDENTS...**
A sure sign of dragging is when the entire anchored fleet around you begins the move to windward.

☞ **INSTRUCTORS TAKE NOTE...**
Possible causes for dragging anchor:
- Anchor can not penetrate hard bottom or ledge.
- Chain got tangled in the flukes and prevented proper set.
- Weed fouled anchor and prevent flukes from digging in.
- Anchor is too small for boat in the prevailing wind and sea conditions.

Procedure for Weighing Anchor:

1) Under power, the helmsman proceeds forward slowly in the direction of the anchor while the crew on the bow takes in the slack until, on a signal from the bow, the anchor is straight up and down.
2) The helmsman stops forward progress while the bow crew tries to pull the anchor off the bottom either by hand or by windlass.

3) If there is substantial strain, the helmsman can power forward for a short distance to break out the anchor by capsizing it.
4) The anchor should come up easily while the helmsman maintains station to keep the anchor from swinging back against the topsides.
5) In muddy areas, a mop, buckets of sea water, or a deck hose will help dislodge the grudge before the chain and anchor arrive on deck.
6) The anchor should be secured on its bow roller with a restraining pin or lashing, and the chain and rode stowed. If there is no bow roller, the anchor must be stowed securely in its proper location along with the chain. The rode should be coiled in large loops ("flaked")and tied in three or four locations with light line to keep the coil from tangling. After drying, the rode may be folded on itself and stowed where it is readily available for emergency anchoring.

Windlasses. are wonderful for preventing possible back strain from lifting and twisting an unwieldy heavy object on an unsteady deck.

- A manual windlass works with a long handle to crank the rode up a little at a time. It is slow but allows the use of larger anchors.
- An electric windlass is less work and faster but draws a great deal of amperage (150-250 amps on a 12-volt system during the several minutes of weighing anchor) which must be considered in the overall electrical plan of the boat and, in most cases, requires the engine or generator to be running when it is used..
- Windlasses should be respected and used very carefully -- they can cause severe injuries if hands are used in front of the drum or wildcat. Because the strain on a line or chain may not be obvious with a powerful windlass, crew members should stay as clear as possible in the event that a line parts or the chain jumps the wildcat.
- Windlasses are exposed to weather and a great deal of salt water (unless on a lake). They should be properly maintained and the wires checked regularly for corrosion.
- As with any piece of equipment, follow the manufacturer's instructions for installation and use.

Problems with Anchoring

See how many potential problems your students can anticipate may arise and how they would avert them or resolve them.

- Anchor dragging on bottom weed
- A rocky bottom that can pin the anchor
- Old pieces of cable, chain, and other debris
- Retrieving an anchor under another boat rode
- Your anchor rode twisted around your keel
- Setting two anchors

Dragging on weed. Has two common solutions -- try another spot or anchor again in exactly the same spot after the weed has been cleared by the first pass of the anchor.

A rocky bottom and a bottom with debris like ship's chain can snag an anchor making retrieval difficult. (Lighter anchors may be damaged with the side loads from a swinging boat or when trying to break out the anchor.) A plow anchor handles rocky bottoms better, and as an added precaution, the crew may attach a trip line on the anchor to have a means of lifting the anchor opposite its holding angle.

Another anchor rode or chain may prevent a boat from breaking out its anchor in the usual way. The most practical solution is to notify the other boat who will hopefully agree to pull up his or her anchor. If that is not possible, the other alternatives are not too desirable. A grappling hook may be used from a dinghy to "fish" for the other line or chain on the bottom and shift it enough to weigh anchor. An alternative is to use the weighed bight of a long line to run down the other boat's rode and lifting it clear of the path of the anchor to be retrieved.

Fin keels may occasionally snag their own anchor rodes in areas where currents shift quickly. First use a diving mask to make sure the rode is clear of the propeller and rudder, then use the engine in forward and reverse to pivot the boat around. It is important to take up any slack in the rode when the prop is turning.

Setting two anchors may be wise in certain conditions but can also create problems. If other boats are on a single anchor, the boats will swing differently and boats may bump. If changes of wind or current cause a boat to swing around, the rodes become twisted. One rode may need to be unwound from the other before either anchor can be retrieved.

Anchoring Variations

> **TEACHING TIP...**
> As with all sailing, anchoring is full of caveats and specialized techniques. It is better to approach anchoring from the point of view of analysis of conditions and what may be needed to contend with them -- rather than explaining a range of techniques like Bahamian anchoring, double anchoring, Med mooring, or fore and aft anchoring which can give the impression that anchoring needs an understanding of differential calculus.

Different cruising areas have developed different styles of securing boats based on:

- Water depth.
- Consistency of the bottom.
- Wind strength and direction.
- Tidal current and range.
- The demand for anchoring space.

Where tide ranges are great, currents strong, and high winds from various directions are common as in England, boats commonly anchor with **heavy anchors and chain**. In crowded areas protected from wind, the boats are moored or anchored fore and aft aligned with the current to prevent swinging.

Where water is fairly shallow, anchorages can be crowded, the holding ground is moderate, and winds are from a constant direction as in the Virgin Islands, **double anchoring** is common. The anchors are set about 60° apart to limit swinging, but this works best where wind and current would not swing the boat in a circle, twisting the rodes.

Where wind tends to blow across a tidal current that reverses and a boat may not have room to swing, the double anchors are widened to 180° in line with the current to hold station. This **Bahamian mooring** can also become a tangle if the boat swings in full circles.

When anchoring in a tidal river, bow and stern anchoring is another technique which is useful for this situation with current direction changes. It is not necessary to go into detail at this level. unless this is a local condition.

WEATHER

KEY CONCEPTS TO TEACH

- Cruising is inseparable from weather

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Forecasting for passage/cruise

Weather should never be very far from a sailor's thoughts. It will affect sailing performance, comfort, ETA, or all three. Some parts of the country have weather forecasts that repeat day after day. Other areas seem to spawn spontaneous thunderstorms or dense fog. The patterns are not mysterious but the details can be hard to predict.

The elements of weather break down into temperature, barometric pressure, and humidity. Forecasting must anticipate how the three will interact to create wind, rain, blizzards, heat waves, and other events.

Which Way Does Weather Approach?

The answer is -- it depends.

- Within the grand scheme, the jet stream steers high and low pressure areas across the continental U.S. For the most part weather patterns travel from west to east.
- Between about 30° North and 30° South latitude, the weather patterns travel from east to west as illustrated by the trade winds.
- On a local level weather changes usually approach from windward. If a black cloud develops on the leeward horizon, it will probably not be a problem. (But watch it anyway.)

✓ **SAFETY TIP FOR YOUR STUDENTS...**
"Keeping a weather eye" not only means watching for weather but looking to weather (windward) for changes.

Your students may or may not have paid attention to weather, other than to note whether an umbrella would be needed to get to work. Encourage them to observe weather and build their own powers of observation and forecasting of local conditions.

Meanwhile, make a practice of having students listen to VHF NOAA Weather Radio, which gives both local forecasts and weather observations along the coast that are indispensable for anticipating conditions for a day's sail or planning the next night's harbor.

The Weather Channel on cable television is a valuable resource to those seeking a visual representation of weather. The 24-hour broadcast also gives a lot of information about weather and seasonal patterns.

Wind (in the Northern Hemisphere)

A few basic facts will be helpful to your students:

- Winds around high pressure systems rotate clockwise.
- Winds around low pressure systems rotate counterclockwise.
- The closer that isobars are together on a weather map, the greater the pressure gradient, and the stronger the wind will be.
- For the same reason, the faster the barometer goes up or down, the more wind there will be.

Rain and Fog

Rain and fog are concerns of sailors, not only because they test cheap foul weather gear, but because they reduce visibility, making navigation and collision avoidance more difficult. In the case of the former, care and GPS or Loran are helpful. In the latter case, radar and a radar reflector are helpful.

Air and Water Temperature

Make your students aware that both air temperature and water temperature should be considered when planning a cruise. When on the water, the temperature may be cooler, requiring more clothes. And at times, it may be warmer when there is no shade from tropical sun. Experienced sailors pack to ward off sun, rain and cold. With planning, one moderate sized duffel can suffice.

HEAVY WEATHER

KEY CONCEPTS TO TEACH

- Safety and comfort of crew and boat come first
- Plan ahead for bad weather and be able to adopt new plans

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Shortening sails and effects on balance
- Use of boom preventer
- Heaving-to in heavy weather

KNOWLEDGE SKILLS:

- Warning signs and plan of action for squall or storm
- Heaving-to in heaving weather

High winds and seas raise a reaction between apprehension and panic with inexperienced sailors, mostly caused by a fear of the unknown. They do not know what will happen, how bad it will get, or what they will do in response. Unfortunately, sailing schools cannot simulate heavy weather for practice; nevertheless, students can become prepared to some extent.

✓ **SAFETY TIP FOR YOUR STUDENTS...**
If there is a goal in heavy weather sailing, it is to lessen discomfort and hard work for both the crew and the boat.

The best course of action is to:

- Learn about weather and listen regularly to forecasts.
- Watch for changes in local conditions.
- Have the necessary sails and boat and safety gear on board and be ready to use it.
- Know the boat's position relative to navigational dangers and which way is the safest to run.
- Practice the procedures with the crew before the weather hits.
- Wear a PFD.
- Rig jacklines and wear a safety harness with the tether always attached to the jackline or a padeye in the cockpit (more details in Coastal Passage Making).

These steps will not guarantee that everything will work perfectly in a squall or prolonged storm, but the overwhelming problems of surprise, indecision and/or panic will be allayed.

Ultimately the best way to learn to sail in heavy weather is to be with an experienced crew on a well prepared boat. While descriptions make it sound exciting or scary, it is primarily a period of hard work and discomfort ranging from mild to extreme. But so is long distance running or downhill skiing, and at least on a boat you can sit down.

Depowering and Balance

Once again, sailing is a balancing act. As the wind increases, the sail area decreases, and the trick is to find the combination of sails for any given wind and sea condition that suits a particular boat.

- The boat needs to be depowered so that it will not be driving too hard through the resistance of the seas. The strain is hard on both the boat and crew.
- Too little sail, however, is equally uncomfortable and potentially dangerous. The boat can wallow sluggishly and unevenly in the churning seas, and without adequate steerage, the seas may push the hull beam-on the building waves, causing the boat to roll.

Land and Heavy Weather

A major concern near a coast is where land is and what it offers. Land can offer a haven from the storm, or land can mean an ominous leeward shore.

The best direction to go in a storm may be offshore. In a moderate to bad storm, a questionable navigational approach, an engine that stalls in a channel, or an anchor that doesn't hold will have more catastrophic consequences than being wet and tired on open, deep water.

Heavy Weather Decision Making

Your students already have many of the techniques for handling heavy weather at their disposal. See if they can figure out responses to hypothetical situations you describe. If they can work the responses through with you, the instructor, they will have a reasonable ability to carry out the plans on other boats with other crews in the future.

> **TEACHING TIP...**
> A sample heavy weather scenario for students to consider.
> A 40-foot boat is four miles east of coast. The nearest harbor is 15 miles north. Wind is gusting 25 knots from the east and building squalls to the northeast. Crew members consist of student and one other of equal experience and two competent crew experience.

Your questions should lead them to consider:

- Checking weather radio
- Reefing main and jib, and setting preventer
- Changing to storm jib
- Motorsailing
- Finding a protected harbor
- Heaving-to
- Running off with sails or bare poles
- Trailing warps or sea anchors

Weather radio. May give an indication of the duration and severity of the weather to come. This is key in making decisions. Will it blow over soon? Is the wind going to shift? Is more on the way?

Reefing. Has been covered before. The important thing is to reef before the boat is seriously overpowered. With a squall approaching, reef before the wind comes up; even though on some occasions the boat may end up only in a drenching rain with no wind. Feeling a little foolish momentarily is better than trying to stand on a pitching deck with a boom flailing around and too much noise from wind and sails to understand the shouts of a crew member ten feet away. If overpowered, falling off the wind will help reduce apparent wind, making it easier on the crew members putting in the reef.

You should make the following point to your students: on most boats, reefing takes some preparation. A reef line may need to be led through the cringle on the leach, a snatch block may be needed for a fair lead to a winch, the winch may need to be cleared of another line. All of this can be done before it becomes necessary to reef which greatly reduces the scrambling when the dark clouds approach.

Preventers. Are described in the mainsail section. Their regular use in rough conditions can prevent damage to the boom or gooseneck, and, more importantly, preventers can keep a crew member from being hit and injured or knocked overboard.

Blanketing the jib. Blanketing the jib by running downwind with main up will greatly help crew on the foredeck trying to change a headsail or roller-reef the jib from the cockpit in a strong breeze. Just be sure no one lets the jib sheets go, or the sail will fly out before the bow.

Motorsailing. Motorsailing can be a good solution for getting to a safe harbor expediently or for counteracting some of the leeway caused by higher winds and seas. But be aware that some engines may have the cooling water intake exposed by severe heeling, and the oil may not circulate properly.

Motorsailing can be useful at other times as well. By motorsailing to windward in light winds and a left over sea, the mainsail can dampen the boat's roll. The sail acts as a good reminder not to try to motor straight to windward in waves. A boat handles waves better at an angle.

✓ **NAVIGATION RULES REMINDER FOR YOUR STUDENTS...**
A boat that is motorsailing comes under the same navigation rules as a powerboat.

Protected Harbor

Finding a protected harbor is often a priority for coastal cruisers. Unfortunately many believe that this is a substitute for having proper heavy weather equipment on board.

The important characteristics of a harbor in bad weather are:

- It must be easy to find and have a clear, well marked channel.
- It must be protected from waves both from the direction the wind is blowing and will be likely to blow.
- It must have good holding ground for anchors and/or sizable available moorings. A larger anchor than normal may be needed or two anchors may need to be set.
- It must be in a direction that the boat can travel safely

Heaving-to

Heaving-to has been discussed previously in the Basic Cruising section. Once the technique is understood, heaving-to requires practice in a variety of conditions to learn the right combinations of main, jib and rudder for the boat to set itself comfortably. Every boat is a little different. A few refuse to heave-to in certain conditions.

Overall, heaving-to allows a boat to "park" and wait out a blow. If the destination is to windward or a bad shore is some miles to leeward, and making headway is difficult, heaving-to is a good choice. Some distance will be lost to leeward, perhaps two or three miles each hour, but not as much as running off at six or eight knots for several hours.

Running Off

Running off with sails or bare poles is a good option if the destination is in front of you. By running before the wind, the apparent wind is reduced by the boat speed and the boat is not fighting the seas. The amount of sail area (or lack or it) is determined by desired speed and control. A sailor may slow progress in order to make landfall in daylight. The boat is slowed by reduced sails, or ultimately running under bare poles. (More about this in Coastal Passage Making.)

EMERGENCIES

KEY CONCEPTS TO TEACH

- Good seamanship can keep most problems from becoming emergencies
- Use the resources of the boat and crew until outside help is available

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Most appropriate overboard recovery method (i.e., Quick-Stop, Lifesling-type, Quick-Turn)
- Use of emergency steering

KNOWLEDGE SKILLS:

- Plan of action for fouled propeller
- Plan of action for hard aground
- Available overboard equipment
- Overboard recovery methods in larger boats with inexperienced crew
- Overboard recovery under power: when to do and inherent dangers
- Plan of action for engine and steering failures
- Abandoning ship
- Plan of action for holing

The following may come as a disappointment to your more adventurous students: successful cruising does not foster good, hair-raising sea stories.

Good sailors with well-maintained boats and a healthy respect for weather and waves can sail for decades without disaster striking. Good sailors also know never to become complacent: The risk of a serious emergency stays with every boat and sailor that goes to sea.

A good sailor may be embarrassed to lose a mast over the side, but accidents sometimes happen; even if the rig had been regularly inspected and the equipment used has a sufficient safety margin of strength and durability. An experienced sailor should consider his or her actions in removing the debris and fashioning a useful jury-rig as part of good seamanship, not heroics.

Fear of dangerous emergencies can take the fun out of cruising for many inexperienced sailors who are on the water for recreation not adventure. Having plans for handling problems can build confidence without relaxing vigilance.

There is a difference between things going wrong and emergencies. The difference is in the ability to handle the situation; therefore, sailors who are experienced and better prepared have fewer emergencies. (This should be a strong incentive to seek out good instruction.)

For example, unexplained water in the bilge should inspire an immediate check of the through-hulls, hoses, and shaft seal. A loose hose clamp or a split in an intake hose can be fixed without risk to life and property. Ignoring early indicators can lead to emergencies.

During the Bareboat Cruising course, you should make time to **practice overboard recovery**. Use the methods described in the Basic Cruising section.

In spite of due diligence and care, other emergencies can happen to anyone, such as:

- Colliding with a log or container can punch a hole in a boat.
- A spreader can collapse, toppling the mast.
- A short circuit in the electrical system can start a fire.

> ☞ **INSTRUCTORS TAKE NOTE...**
> Caution: Not all cases have solutions. Sometimes the emergency can be resolved, but in other cases the best that can be done is to try to slow the outcome or save what can be saved -- **remembering that life comes before property** -- until help or rescue arrives.

Calling for Help

In an emergency, call for help. Even while others are beginning to contend with the emergency, a crew member who is familiar with radio procedure should call the Coast Guard on Channel 16 VHF immediately.

- If there is imminent threat to life, the call should be "Mayday."
- If not life-threatening but assistance is needed, the call is "Pan."

The Coast Guard will ask a series of questions that are essential to their ability to respond:

What is the location of the vessel? Either Latitude and Longitude from the Loran or GPS, or range and bearing from a landmark or aid to navigation.
What is the description of the vessel? Type of boat, length, hull and deck colors, name, etc.
How many people on board and are they are wearing PFDs?
Are there any injuries and what is the condition of injured person?
What is the situation?
What assistance is needed?

After the initial communication, the radio should be monitored for further information or calls from arriving help.

Remind your students to do what the Coast Guard tells them to do. The Coast Guard has more experience with emergencies and search and rescue (SAR) than the rest of us do.

Distress Signals

Distress signals attract attention and should be used in conjunction with a VHF radio "Mayday" call if possible. Flares and EPIRBs should be stowed within immediate reach of the companionway.

- Red parachute flares can be seen from several miles away at night. The SOLAS flares are brighter, burn longer and are more expensive than the minimum standard for Coast Guard approved flares.
- Orange smoke from canisters, hand held flares, and dye markers are all useful for pinpointing the vessel or raft to be rescued.
- EPIRBs (Emergency Position Indicating Radio Beacons) must only be activated in an emergency and must be left on to permit the Coast Guard's specialized equipment to home in on the signal.
- Waving arms up and down is also a recognized distress signal.
- In poor visibility, a continuously sounding fog horn can be used.

Dismasting and Rigging Failure

A rigging failure does not inevitably mean a dismasting, but the crew would have to act fast. The first thing to do is relieve the strain on the mast. If the windward shroud parts, tack. If the headstay fails, swing the boat downwind. If the mast stays up, a halyard can be jury-rigged to replace the stay -- possibly with enough tension to support a small jib or reefed main, depending on conditions.

Dismasting is a shocking experience, and it rarely happens cleanly. People can be injured. The lifelines and deck may be damaged. Ripped sails and rigging make climbing around the deck difficult and dangerous.

Then there is coping with the clean up.

- The broken section of mast may be banging on the hull threatening more damage.
- The VHF radio will not transmit well with its antenna underwater.
- The sails, the stays, and the halyards all become encumbrances to securing the broken section on deck or dumping it over the side if it cannot be saved.

> ✓ **SAFETY TIP FOR YOUR STUDENTS...**
> Crew members must be reminded not to put the engine in gear until all lines are out of the water.

The necessary equipment on board may mean the difference between a bad day and a serious emergency.

- A sharp knife will cut the sail and the rope halyards away.
- Large boltcutters or a hacksaw with plenty of sharp blades will cut wire stays and halyards.
- A proper-sized drift pin and hammer are needed for rod rigging. The stays cannot be cut. The clevis pins that hold the turnbuckles to the chainplates must have the cotter pins removed so the pins can be knocked out.

Make sure your students know that all of this is much harder to do than it sounds. In addition, the rolling motion of the boat will be very much sharper without the mast.

Emergency Steering

Let your students know that every boat with wheel steering should have an emergency tiller that can be quickly installed should a steering cable break. Show how it is used, and point out that many emergency tillers are too short to provide the helmsman with much leverage. (Some boats carry a piece of pipe to slip over the tiller end to provide the needed additional leverage.) They may have to rig blocks and tackles to fittings on the rail to steer in anything but the most benign conditions.

Holing

Hitting logs, submerged containers, or other vessels can be catastrophic, or can be manageable. Whether or not the damage to the hull is extensive, immediately begin steps for worst case. The crew should put on PFDs. While one experienced person assesses the damage, a crew member should be assigned to every pump on the boat, and buckets can be used as well. It should be apparent fairly quickly whether the pumps can keep up with the flow. If assistance is needed, call the Coast Guard.

Stanching the Flow. If the hole or crack is at or above the waterline, heel to boat to raise the hole above the waves. Whether or not the hole is above water, try to work out a way to plug the hole or at least lessen the flow into the boat.

✓ **SAFETY TIP FOR YOUR STUDENTS...**

Pumping is very tiring and may have to be continued for a long time. It is important to get into a rhythm. It also helps to be using good-sized pumps that are installed for easy use.

- Larger capacity pumps with longer handles are obviously more effective.
- Remember, smaller boats should not have smaller pumps. *The amount of water that would fill a bilge on a large boat, can sink a smaller boat.*

The hole possibly may be covered from the interior or exterior.

- **From the exterior**, a small sail may be positioned over the hole. In order to accomplish this, lines are tied to the corners of the sail, and the open sail is dropped over an end of the boat. The crew use the lines to work the tensioned sail into position and then tie the lines securely. (This may be impossible if the keel is in the way.) The water pressure will push the canvas into the hole, slowing the flooding.
- **From the interior**, getting at a hole in the hull can be difficult. It may be behind built-in furniture or behind the interior fiberglass liners that have become common on production boats. Destruction may be necessary.

Once the hole is exposed, the crew will need material which will conform to the irregular shape of the hull and will span the opening. A seat cushion, duffel bag with clothes, or a Nerf-type foam football may work, or a mattress or sail in a turtle may be needed for larger areas of damage.

The soft material is used as a gasket, but it must be held in place by something strong enough to resist the outside water pressure. Some possibilities include locker doors wedged in place with a whisker pole or mop handles.

The primary objective is to buy enough time to save the crew and the boat.

If possible, consider maneuvering the boat to shallow water and near shore. In coastal sailing that may not be very far away. This provides the opportunity to beach the boat, or at least have it sink where it can be recovered, and allow the crew to reach land.

Fire

The thought of fire on board frightens any sailor. In fact, unless the fire is well contained, accessible, and caught early, there is little that can be done and little time in which to do it.

Abandoning ship may be the only safe option. Evacuation must be kept in mind. The crew should put on PFDs, use the radio to call for help, and prepare to leave the boat.
If underway, attempt to maneuver the boat so that the fire is downwind. If the fire is aft, point the bow into the wind. The crew can move to the bow out of the smoke and potentially toxic fumes.

Prevention. *Prevention is paramount.*

- Do not keep oily, dirty rags.
- Pay attention to the stove.
- Use and maintain high standards for the electrical systems.
- Inspect the engine and fuel supply for leaks.

The common causes of fire on board require individualized responses.

Galley Fires. Food or cooking oil on the stove can catch fire and can be doused with a bucket or kettle of water. Some boats carry a "fire blanket" made of nonflammable material to smother localized flames. The cooking fuel should be turned off at the tank.

Propane and CNG Stoves. The fumes of propane and CNG are explosive. CNG is lighter than air and tends to dissipate out of the cabin (but the drawback is that in some cruising areas it is hard to find a place that will refill it). Propane is heavier than air and gas from a leak can accumulate in the bilge until a spark from anything (like a bilge pump switch) ignites it into a fireball.

The best chance of controlling a propane fire is to prevent it.

- Stoves should have "blowout sensors" to cut the gas feed if the burner blows out.
- An electric solenoid switch in the galley can conveniently turn off the gas at the bottle. (The solenoid can also be turned off using the breaker at the electrical distribution panel.)
- When leaving the boat, the valve on the bottle should be manually closed.

Alcohol Stoves. Some boats still have alcohol stoves. The fuel is non-explosive, but alcohol stoves can be temperamental which can cause the liquid fuel from a pressurized or gravity-fed tank to leak, catch fire, and spill from the stove onto the cabin sole and elsewhere. The valve for the tank should be accessible from the front of the stove. If it hasn't started something else burning, alcohol can be put out with a generous quantity of water. *Always have a full kettle of water handy when using an alcohol stove.*

Engine Compartment Fires. Diesel fuel is not explosive like gasoline. Diesel engines are safer as auxiliary power for sailboats, but diesel fuel does burn. It is wise to inspect the fuel feed and return lines regularly for any small leaks and to keep the oil sump under the engine clean of oily waste. (Dispose of the waste into proper receptacles at marinas or boat yards.)

If smoke is seen coming from the closed engine compartment, it could be an exhaust problem, or it could be a fire caused by a fuel or electrical source. The problem with engine compartments is that they are often poorly accessible for a clear shot from a hand-held extinguisher.

- Turn off the fuel feed valves and the battery switches (unless needed for the radio).
- Some compartments have a built-in extinguisher -- a container with an oxygen-displacing gas to smother the fire. Halon, a fluorocarbon, has been used in the past, but is now a banned substance. A remote switch releases the extinguisher without the need of opening the compartment.
- Some people prefer to open the compartment to make sure it is a fire (then close it) before discharging the extinguisher.

If the compartment does not have a built-in system, two options remain.

1. With a B/C extinguisher ready, open the engine compartment from a direction that affords the firefighter a safe means of escape.

2. Close the engine box and cover the air intake vents for the engine. If the compartment is contained and well insulated enough, the oxygen supply may be stifled quickly.

Electrical Fires. May start anywhere in the system due to short circuits, bad wiring, or faulty connections The source may be inaccessible.

- Cut off electrical supply: turn off battery switches or unplug shore power. (Realize that this turns the radio off too.) Use whatever means necessary to uncover the source of the fire, and use an extinguisher rated for C Class fires.

Fire Extinguishers. Fire extinguishers which can be used on A, B, and C Class fires should be readily accessible on board and their locations known to all the crew. One should be within arm's length of the galley and engine compartment. One should be forward. And one should be in a cockpit locker for use from the deck.

To use: Aim the extinguisher at the source of the flames, remove the safety catch or pin, squeeze the trigger, and use a steady sweeping motion of the spray to cover the area. Empty the extinguisher before stopping.

After the fire is out: The chemicals used to extinguish fires have after-effects. The chemicals are bad for the lungs, and can have corrosive effects on electrical equipment. Once the boat has been saved, there will be a lot of clean up and replacement to do.

Maintenance: Fire extinguishers must be serviced annually and should be checked regularly for signs of rust, damage, and proper pressure readings. It is recommended to shake the cylinder every month or so to keep the dry chemicals from clumping at the bottom.

☞ **INSTRUCTORS TAKE NOTE...**

Classes of fire:

- Class A -- Ordinary combustibles like wood or paper
- Class B -- Flammable petroleum-based fires
- Class C -- Electrical fires

✓ **SAFETY TIPS FOR YOUR STUDENTS...**

IMPORTANT WARNINGS:

- Never let a fire get between you and an exit.
- Any substance that is effective at starving a fire of oxygen, can do the same to human beings. Consider your own air supply.
- Many of the substances used in the structure and accommodations of boats produce toxic fumes when burned. A person below can quickly be overcome.

Abandoning Ship

Abandoning ship is only done when the greatest threat to life is to remain on board. Sinking and fire are two good examples. If a vessel is not already standing by, issue a Mayday on Channel 16 giving your position before leaving the boat.

The event may be as simple as stepping onto another vessel on a peaceful afternoon. (Boats sometimes do sink in beautiful calm weather) At other times, the act may be the scariest, most dangerous moment in a lifetime, with little chance to think twice.

With any luck, a Mayday call will bring a vessel to the rescue. The best alternative is a liferaft. Dinghies can be used, but there may not be enough time to manually inflate a rolled up dinghy, and a rigid dinghy may not have the capacity for the whole crew.

- Liferafts can weigh 70 pounds or more. They are not easy to move on a pitching deck.
- A liferaft should be stowed where it would take less than 15 seconds to deploy it over the rail.
- The painter should be tied off or held as the raft is thrown in, then pulled out to its full length -- usually 15-20 feet (or as much as 60-80 feet) -- to activate the CO_2 cylinder to inflate the raft and canopy.

The crew may need to jump in the water to get in the raft using the boarding ladder by the access hatch.

Most liferafts have a variety of gear packed inside. A list should come with the raft. Commonly, the raft will have:

- A small quantity of canned drinking water and food.
- Flares and distress signals.
- A flashlight and batteries.
- A knife.

On some rafts, this material may be in a separate "grab bag." Know which kind you have!

✓ **SAFETY TIP FOR YOUR STUDENTS...**

EPIRB -- Emergency Position Indicating Radio Beacon -- is a valuable (and expensive) piece of safety equipment. When activated, it sends a signal on a frequency monitored by all commercial aircraft and some satellites. As it continues to transmit, the Coast Guard can home in on the signal to rescue the vessel or liferaft. Non-emergency use of an EPIRB wastes a lot of Coast Guard time and resources, and improper use of an EPIRB is strictly illegal.

If possible, it is wise to bring along an EPIRB and a handheld VHF radio in a waterproof pouch. Even a few miles from shore, a raft is a small item to spot, and it will drift with the wind and current from its original position.

Be prepared that a life raft will be wet, cold and/or hot and very cramped if there are six people in a six-person raft. The motion will be uncomfortable.

As an instructor, you may choose to pass along a homily: "Do not step into a liferaft until you have to step *up* into the raft."

TROUBLESHOOTING

KEY CONCEPTS TO TEACH

- Eliminate the simplest causes of problems before calling for help
- The importance of instruction manuals, drawings, tools, spare parts and proper installation of equipment

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Engine troubleshooting
- Troubleshooting boat's systems: steering, electrical, refrigeration, the head

Troubleshooting the systems on a sailboat is part of the infinite continuum of germane deductive logic that intrigues the cruising sailor. There is always more to know and new equipment to understand. You may as well tell your students now that even the experts don't know everything.

At this point of instruction, you should inspire the students to learn more about the systems without overwhelming or discouraging them with their initial lack of knowledge. The more a sailor learns about the boat she or he is sailing, the easier things will go.

Ideally, every boat would have an organized set of:

- Drawings including wiring and plumbing diagrams.
- Instruction and installation manuals for all installed equipment.
- Spare parts for the engine, head, refrigeration, stove, and electronics.

✓ **HOT TIP FOR YOUR STUDENTS...**

A good rule of thumb: don't get into disassembling and diagnosing any deeper than you are prepared to fix. For example, if a fouled injector pump is suspected by process of elimination, don't take it apart unless you have the specialized tools and parts to repair it.

This would make troubleshooting and repairs quicker and easier for both amateur and professional servicing.

Basic daily checks are important. Small problems may be spotted during routine inspections. The daily checks were introduced in Basic Cruising and the good habit of checking the bilge, engine compartment, engine oil, etc. should be continued.
The following are guides to some of the problems that most commonly go wrong with systems on a boat. The objective is to resolve or eliminate the obvious causes, and if necessary, call a professional to do the rest.

Engine

Diesel engines are relatively simple mechanical devices. They need a steady supply of clean fuel and air, a clear exhaust line, and adequate cooling and lubrication for the moving parts. The helmsman should check the engine gauges every 10-15 minutes when the engine is on. If something changes or an alarm goes off, investigate immediately.

> ☞ **REMINDER TO SAILORS...**
> It is possible to cruise (and enjoy oneself) without an engine, electricity, electronics, refrigeration, or a head, but it takes skill and adaptation.

The following are factors that a cruising sailor can usually do something about.

Starting. If the engine does not turn over, check:

- ☑ Switches for the engine battery, distribution panel, and ignition.
- ☑ Gear/throttle in neutral.

If the engine has difficulty starting, check:

- ☑ Preheat has been used for 15 to 20 seconds.
- ☑ Tank has fuel and the fuel supply valves are on.
- ☑ Throttle is open.
- ☑ Decompression lever ("engine stop," "kill switch," "choke") is in "Off" position.
- ☑ Engine battery has full charge.
- ☑ Auxiliary equipment is not loading the engine drive (e.g., refrigerator is off).
- ☑ Exhaust hose is open and unkinked. (There may be a seacock at its through-hull.)

If the starting procedure is correct, something is wrong with the function of one of those items or there is a serious problem with the inner workings of the engine that is beyond the scope of most cruisers.

Misfiring , Poor Idling, or Loss of Power. If the engine manages to start, but does not run well, first suspect the fuel supply, then air. Check:

- ☑ Fuel pre-filter and filter. A clear bowled separator will show if there is significant water and debris in the fuel. Drain the contaminated fuel from the valve at the bottom. The paper insert in the primary fuel filter may be clogged with finer impurities. Replace it with a new one.
- ☑ Loose fittings in the fuel line. Air may be leaking into the lines. Tighten until snug.
- ☑ Air filter for clogging from dust. Clean or replace.
- ☑ Exhaust line. It may be plugged or restricted.

If these seem okay, the problem may lie with the injectors or valves, or in the cylinders. A mechanic is needed.

Overheating. Can seriously damage an engine. It cannot be ignored, nor should one assume that the temperature gauge must be at fault. The problem is probably with the lubricating oil or the cooling water system. Check:

- ☑ Oil level. (The boat should be on an even keel.) Add oil, but do not overfill.
- ☑ Whether plenty of water is coming out with the exhaust.

If not, check:

- ☑ Raw water intake: Seacock open? Water filter clear?
- ☑ Water pump for leaks. Open pump to see if impeller is intact. Replace gasket and impeller as needed.

Other causes for overheating take more expertise to fix.

Low Oil Pressure. When gauge or alarm indicates low pressure, check:

- ☑ Oil level, with the boat on an even keel.

If it is at proper level, the problem may be with

- Oil of the wrong viscosity.
- Deeper problems with gauges, relief valves or bearings.

✓ TEACHING TIP...
After discussing trouble-shooting the engine with your students, have a "practice drill." For example, announce that the engine is overheating or is losing power. See what the acting skipper has everyone do. Another example could be the analog knotmeter suddenly reading zero.

✓ HOT TIP FOR YOUR STUDENTS...
Before adding any fluid to an engine, be sure you know which opening is proper. Charterers frequently report oil in the fresh water tank or water in the oil sump from mistakes.

Black Smoke. Black smoke from the exhaust is indicative of other problems. Check:

- ☑ Bad fuel quality
- ☑ Plugged air filter
- ☑ Plugged exhaust
- ☑ Overloaded engine due to high revs, towing, or rope wrapped on the shaft

White Smoke. White smoke from the exhaust can mean a compression problem or air in the fuel lines, or overheating, with emerging steam instead of water. Check:

- ☑ Decompression lever is closed.
- ☑ Water is discharging from exhaust.

Beyond that, find a mechanic.

Steering System

The steering system on boats is straight forward if not always easy to access. From a troubleshooting point of view, occasional inspection and maintenance should uncover developing problems.

About the only symptom of a steering problem is that the wheel steering starts to feel "sloppy" where there is a dead area between the feel of the rudder loading on the port and starboard sides. Check:

- ☑ Tension on the steering cables to the quadrant. If very loose, the cables can jump off the quadrant. They should be just tight enough to remove the slop.

Periodically, inspect the system. Check:

- ☑ Cables, looking for wear or broken strands of wire. Replace as needed.
- ☑ Rudder bearing or stuffing box for leaks. Repair or replace as needed.
- ☑ Steering pedestal. Open the pedestal and grease the chain that engages the wheel sprocket. If the compass needs to be moved, be sure to make a small scratch on the compass and on its binnacle seat to make alignment correct when reinstalling it.

If part of the wheel steering system fails underway, simply install the emergency tiller and use that until reaching harbor or a repair can be made.

Electrical System

In order to use electricity, a cruising boat must be able to make electricity (alternator or generator), move it (cables and wires) store it (batteries), and control it (voltage regulators, circuit breakers, fuses). Things can go wrong with any part of the system, and modern boats can get complicated with shore power hookups; so that the boat is wired for both DC at 12 volts (or 24 V) and AC at 110 volts. An inverter is needed to change DC to AC and a converter for AC to DC; so that everything can be operated all the time: the 12 volt refrigeration and VHF radio can run with shore power, and the VCR and microwave can operate at sea.

Making assumptions can create costly mistakes. These systems can be highly customized and difficult to troubleshoot without full documentation of the specifications and installations of the equipment, but at least there should be a way to tell the voltage of the batteries -- engine and house -- and the amount of amperage being charged. Here are some basics.

The Battery Does Not Accept a Charge. Check:

- ☑ Alternator drive belt. It may be loose or broken. Tighten or replace.
- ☑ Battery for water level and specific gravity. If the battery is dead or old, a replacement is in order.

If the belt and battery are above suspicion, the alternator may need to be rebuilt or replaced.

The Batteries Charge Poorly. Check:

- ☑ Tension of the alternator belt.
- ☑ Connections and terminals from the alternator to the batteries.
- ☑ Open circuits from the batteries. Is there a heavy draw on the batteries or a short?
- ☑ If the battery voltage was drawn way down, the charging may take longer than usual.
- ☑ Age and use of the batteries. They may need replacing.

Again, beyond simple checks, the alternator or voltage regulator may be at fault or improperly suited to the batteries and system.

Certain Electrical Equipment Does Not Work. Check the following and the manual:

- ☑ Power switch is on.
- ☑ Circuit breaker on the electrical distribution panel and reset.
- ☑ Fuses within the unit.
- ☑ Bulb.
- ☑ Loose wire connections and for breaks or corrosion. Clean and repair.
- ☑ Instruments like the wind indicators or knotmeter, see if there is input. Is the impeller fouled? Is the wind vane missing?

Refrigeration

Refrigeration is either a luxury or a necessity on a boat -- depending on your point of view. Cold drinks and ice cream come at the cost of yet another system to troubleshoot.

Thumbnail Sketch of How Refrigeration Works. A **refrigerant** substance (until recently Freon) is circulated through a system of tubing. A **compressor** creates high pressure in one half of the system and low pressure in the other half. The refrigerant leaves the compressor in a gaseous form under high pressure and enters a **condenser** where it is cooled below its condensation point and becomes liquid. The cooled liquid flows under pressure to an expansion valve at the **evaporator** or **cold plate** in the refrigerator. The pressure drops suddenly and low enough that the liquid refrigerant vaporizes (in a more complete and refined way than bubbles of gas escaping when the pressure is released by opening a soda bottle). This change of physical state absorbs heat from the cold plate, thereby chilling the plate. The refrigerant, as a gas, is pulled back to the compressor under suction where the cycle continues.

The temperature of the plate continues to drop as the refrigerant circulates until the temperature reaches a point that inhibits vaporization at the atmospheric pressure within the cold plate tubing. In a refrigerator, that could be at or below 32° F, and in a freezer, 0°F.

Understanding that, one can see that leaks or slight variations of temperature or pressure within the system can cause havoc. There are a few things for a non-expert to keep an eye on.

- <u>Condensers</u> are normally water-cooled on boats and there should be a continuous steady stream of water coming from the overboard discharge, otherwise the unit will overheat.

- A **compressor** commonly is driven by a belt off the engine. An electro-magnetic **clutch** attached to the belt pulley controls whether the belt drive engages the compressor. With the engine running at the RPM's sufficient for battery charging, the switch or timer for the refrigeration is turned on. Often, you can hear the engine noise change as it comes under more load from the compressor. If the drive belt is slipping or the clutch is faulty, the compressor will not work efficiently.
- A **sight glass** in the tubing on the liquid, high pressure side of the system is a useful device for diagnosing whether there has been a refrigerant leak. It is usually located near the RFD (receiver/filter/dryer) that looks like a glass cylinder in a metal housing.

    - When the unit is off, the sight glass is clear.
    - When the clutch is engaged, clear liquid with bubbles will stream past.
    - The bubbles should disappear when the system has cooled down to normal operating levels.
    - If bubbles do not disappear, more refrigerant needs to be added by a refrigeration specialist.
    - If no bubbles appear, there is not enough refrigerant to circulate. The system needs to be recharged.

The Head

The marine toilet must be treated with respect. Anyone who has ever had to dismantle a toilet to remove a clog develops an abiding respect for (and suspicion of) the system. Preventative behavior becomes paramount. However, inexperienced sailors may view it as compulsive behavior until their turn comes to dismantle a fouled head.

First rule: With the exception of a very small quantity of toilet paper, nothing should go down a marine toilet that has not been swallowed first.

Second rule: If the head is hard to pump or doesn't flush, don't pump. Check:

- ☑ Seacocks are open -- both intake and exhaust, if discharging over the side. Try shutting and opening them to make sure they are fully open.
- ☑ Y-valve (to holding tank) is in the proper position.
- ☑ Holding tank is not full.
- ☑ With crew (if decorum warrants it), if anyone has a clue to the trouble. (See first rule.)

Try the pump again. If still clogged, get out the manual and necessary tools and change into work clothes.

🕮 SOURCES OF INFORMATION

Boatowner's Mechanical and Electrical Manual by Nigel Calder, (International Marine, Camden, Maine 1990)

GENERAL KNOWLEDGE

KEY CONCEPTS TO TEACH

- "No man is an island"

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Dinghy and outboard use
- Flag etiquette

KNOWLEDGE SKILLS:

- Cruising etiquette and courtesies
- Rafting techniques at dock and anchorages
- Documentation for vessel and crew
- Entering a foreign port

This general knowledge section has been included because some of the important information that makes cruising more pleasant does not come directly under topics like seamanship or troubleshooting systems.

- It would be a great oversight for a sailor not to learn how to row and use a dinghy safely.
- Courtesies and customs have developed out of consideration for other people's right to privacy which hopefully engenders reciprocity.
- Flag etiquette is simply a form of communication which identifies the vessel and may say something about its activities.
- Cruising sailors are not beyond legal obligations. In coastal waters, both state and federal law applies as well as international agreements of which the U.S. is a party. Remember that in territorial waters of another country, their laws apply. Freedom of the seas has many limitations.

Dinghy Use

A dinghy is indispensable wherever a cruiser would like to get ashore and there are not marina slips or launch service. In other words, many of the desirable cruising spots.

The choice is between a rigid or inflatable boat that will hold sufficient crew and cargo to cross possibly choppy water:

A Rigid Dinghy. Is easier to row and does not need to be pumped up. Many tow better than most inflatables. They are also a unwieldy nuisance to stow on board, as they need special chocks or davits. But dinghies that also sail can be wonderful entertainment for kids (and adults) in anchorages.

Inflatable Dinghies. They are stable, buoyant, and rarely damage topsides during poor landings. They stow in a small space, but they row poorly and almost always require the use of an outboard and gasoline which also need to be stored safely. Towing an inflatable can be tricky, but if worse comes to worst, it is relatively easy and light to haul aboard and strap down temporarily on the foredeck. It is wise to keep repair patches and contact cement on board.

Avoid overloading dinghies. At best, they are not a very dry means of transport. Distribute weigh evenly and as low as possible. In a rigid dinghy, step into the center of the boat on the bottom or on the thwart. An inflatable will usually support someone stepping on the side, which is handy for scaling topsides.

Rowing. Is a skill with which every cruising sailor should be familiar. It is good exercise, and can come in handy when the outboard runs out of fuel. Most quiet anchorages would be more pleasant without the whine of outboards.

Outboard Motors. Are handy time and energy savers. An outboard should have a secure stowage location on board to reduce the drag and the risk of capsizing a towed dinghy. Gasoline is an explosive substance and should not be stowed below or in a closed locker on board

Landing a Dinghy. Landing is usually easiest if the approach is made at about a 45° angle at slow speed, and turning alongside as the forward motion stops.

Towing a Dinghy. Towing is not difficult but it requires attention and adjustment to conditions.

- The painter should be strong and long enough to tow the dinghy behind the first wave following the boat. This keeps the dinghy from surfing down a following wave toward the boat only to be jerked taut again after wallowing in a trough.
- A towing bridle which divides from the tow rope to each forward side of an inflatable helps flat-bottomed boats from sliding sideways while being towed.

- An alternative is to haul an inflatable (without its outboard) up so that its bow is in the stern pulpit and the transom is riding in the water. It is a very low drag method. (For coastal cruising, it can also serve as a short term liferaft, especially if it contains water and a signal mirror or flares.)
- When entering a harbor or when close maneuvering is needed, the painter should be shortened or the dinghy brought up along side so that the line cannot foul the propeller when the boat backs down.

Courtesy and Etiquette

Courtesy is not something to leave behind when you go to get away from it all. Good cruisers are considerate, do not impose, and respect the privacy of others. Unfortunately, those who are boorish and presumptuous make themselves painfully obvious to other sailors.

Sound Travels Easily on Water (especially in the fog).

- Remember this before playing your favorite Dixieland jazz at full volume or discussing the hideous turquoise gin palace that is anchored 50 yards away. Remember your neighbors -- if kindly predisposed -- might be in a position to retrieve your dinghy for you or pull you off a sand bar.
- You will learn about sound traveling when you have to listen to someone's slapping halyards all night. Remind your students to secure halyards outboard.

Respect Private Property. Tell your students the following common practices of cruising:

- Call below or knock on the hull before boarding someone else's boat.
- Wait to be invited before rafting alongside another boat. Use your own fenders and lines, and make sure the spreaders of the two boats do not align. Keep the adjustable ends of the lines on your own boat to minimize the need to intrude.
- If you must walk across someone else's boat, walk around forward of the mast rather than through the cockpit. And be careful not to track dirt.
- When going ashore, get permission to land or use public landings or dinghy docks.
- In most states, private property runs down to mean high water. The dry parts of most beaches are privately owned: Do not expect to explore ashore except on public property.

Last In First Out. If a problem develops in an anchorage with a change of tide or wind, the last boat to anchor has the responsibility to move or reanchor.

Flag Etiquette. This can get elaborate, but here are some basics:

- Colors should be made at 0800. (Put the ensign up at 8:00 AM) The flag should come down at sunset.
- A yacht ensign (a fouled anchor surrounded by stars in the blue quarter) may be used by U.S.. vessels in U.S. waters. The normal "stars and stripes" should be used outside the country.
- The ensign represents the nationality of the vessel not the nationality of the people on board.
- A club burgee is traditionally flown from the masthead. However, all the equipment carried at the masthead often makes this difficult to do, in which case, flying it from the starboard spreader has become an acceptable alternative.
- When visiting a foreign country, a vessel should fly a courtesy flag (a small national flag of the country being visited) from the starboard spreader.

Legal Matters

Jurisdictions. In U.S. waters, both federal and state laws may apply to cruising boats and sailors, and jurisdictions can get confusing.

- States have jurisdiction over inland waters -- lakes, rivers within the COLREGS lines -- and over control of resources, such as fish and oil, out to three miles offshore. States may let towns oversee harbor management for matters like mooring plans and permits. States have differing regulations on recreational boating activities.
- The federal government has sovereignty over the territorial sea -- a band from the coast out to 12 miles offshore -- where U.S. laws apply.
- The federal government also has jurisdiction over living and non-living resources in the Exclusive Economic Zone (EEZ) which extends from the territorial sea to 200 miles offshore.
- Other countries may claim different limits of jurisdiction over offshore waters.
- Legal matters anywhere within U.S. waters that are subject to interstate commerce and concern vessels and navigation generally come under admiralty law, a specialized body of federal law.

States and the Coast Guard share the responsibility of enforcing rules and regulations on the water and responding to accidents. Your students should be aware that there are legal limits to operating a boat while intoxicated.

Boarding by the U.S. Coast Guard. Sailors should be aware that a U.S. vessel may be subject to boarding by the Coast Guard at any time. The Coast Guard does not need a search warrant. The Coast Guard may inspect for required safety and navigational equipment, such as PFDs, foghorns and bells; for compliance with environmental laws on oil pollution and sewage discharge; and for illegal substances, such as drugs.

Salvage vs. Towage

- If a person finds or rescues a vessel, the boat and its contents does not become that person's property.
- If your boat breaks down and someone offers to tow you in they cannot claim your boat.
- If someone spends a great deal of time and effort at risk to himself and his property to keep your boat and its contents from being seriously damaged or lost, that person may file a claim for salvage in admiralty court. The court will determine a reward based on the circumstances of the rescue. The upper limit is not more than 50% of the value of the vessel and cargo. In most cases, which include commercial ships, the reward is around 10%.
- Salvage may not be claimed for rescuing a human being.
- To avoid a claim of salvage, if you are on board a vessel that is in trouble, whether it is drifting toward rocks or it has been dismasted, agree to terms for aid or towage in advance of help being given. A written agreement is better.
- In addition, several sources recommend using your own line as a towline. It seems to be evidence that you were in control of the situation.

END OF THE CRUISE

KEY CONCEPTS TO TEACH

- Shipshape and clean
- Boat is secured

STUDENT OUTCOMES

PRACTICAL SKILLS:

- Docking under power in upwind, crosswind, and downwind situations
- Docking under sail in adverse conditions
- Securing boat properly
- Returning charter boat in same condition
- Charter check-in report

KNOWLEDGE SKILLS:

- Precautions of docking a charter boat under sail
- Responsibilities of charter customer

A cruise does *not end* until the boat is safely secured, cleaned up, and all gear properly stowed.

Before leaving a boat:

- ☑ Center and lock steering wheel.
- ☑ Hose off salt water off deck as needed.
- ☑ Rinse and dry foul weather gear and running rigging before storing.
- ☑ Shut off cooking gas at tank.
- ☑ Stow all deck gear in lockers or below and lock deck lockers.
- ☑ Close seacocks.
- ☑ Shut off batteries.
- ☑ Remove contents of refrigerator and leave the lid open.
- ☑ Open unventilated lockers to discourage mildew.
- ☑ Take wallets, car keys, and perishable food off the boat.
- ☑ Lock the boat.

SECTION 5

BOAT CHARTERING AND PURCHASING INFORMATION

CHARTERING A BAREBOAT

Bareboat chartering lets you sample the winds of the world, from exotic locations like the South Pacific to closer-to-home cruising grounds in, for example, the Caribbean, Florida, New England, and the Pacific Northwest. Before planning a bareboat charter, you need to think about several things: your budget; your crew (and the crew's sailing experience); what kind of conditions you feel most comfortable with; the time or year you'd like to sail; what other activities you're interested in, from snorkeling to touring historic sites to hiking.

Choosing a Charter Company

It's best to talk with several companies in the area you're interested in and then to choose the company you're most comfortable with. Reputation is critical: your own sailing friends and recent references can help. You'll want to know the size and age of the fleet, though a well-maintained older boat can be a better deal than a poorly maintained newer boat. Ask about the company's maintenance schedule and special services, as well as provisioning and facilities. Do they have a chase boat to provide help if something goes wrong? Can repairs be made quickly? Do they offer information about the area as well as full information about the boats they charter?

The Company Chooses You

Every charter company has requirements: prior experience with a boat of roughly the same size; boathandling skills and ability to handle weather changes; ability to dock the boat and handle anchoring situations; competency with coastal navigation and piloting; and ability to deal with the boat's systems. The charter company will ask for a sailing resume that will allow it to judge your abilities; the company can, at its discretion, place a skipper on the boat (and will charge for his or her services), if it finds, at its discretion, that you are not competent to operate the boat.

The Contract

The contract you'll be asked to sign spells out the legal relationship between the charterer and the charter company. Among the areas the contract typically covers are:

- Payments and payment schedule
- Security deposit (how much, what it's used for, when it's returned) or daily insurance
- Other money matters, such as policy on refunds and cancellations
- Insurance and the limits of the charterer's financial responsibility in case of property loss or damage
- When, where, and how you can sail the vessel.

In addition, most companies require you to verify the competency you claimed on your sailing resume.

In return, the company agrees to turn over the boat you contracted for in good condition. The contract specifies the company's obligation if the boat cannot be delivered as promised or if down time is greater than a stipulated period.

Other Services

You should expect, and reserve time for, a dockside checkout and chart briefing. It's your opportunity to acquire local knowledge as well as a thorough introduction to the boat, its systems, and its inventory.

Most charter companies outside the U.S. mainland (and many U.S. companies) offer a provisioning service, either full or partial. It can certainly be a time-saver and may save you money as well if shopping is difficult or food is costly in the area.

Other Options

For those who are just starting out chartering, or for anyone who would like the services of a built-in guide, taking a skipper for all or part of the charter is a viable option (you'll pay roughly $100/day plus food for the skipper). Some charter companies run flotillas, which offer the security of traveling in company as well as the mechanical and advisory services of the flotilla leader. And, for the full luxury treatment, you can charter a crewed boat, with skipper and cook (at least) to see to your every whim.

Further Reading

Books:

Smarter Charters by Chris Caswell (St. Martin's Press, New York, 1994)
Sailboat Chartering by Melvin H.Ross and James P. Duffy (Globe Pequot Press, Old Saybrook, CT, 1993)

Articles:

"Bareboat Basics" (*SAIL Magazine,* March 1991, p.83)
"Bareboating '94 -- Ecochartering" (*SAIL Magazine,* March 1994, p. 66)
"Cruising in Company" (*SAIL Magazine,* March 1995)
"Rocky Mountain High" (*SAIL Magazine,* June 1992, p. 50)
"Cruiseweek, Southwest Ireland" (*SAIL Magazine,* May 1994, p. 70)
"International Cruiseweek, Scandinavia" (*SAIL Magazine,* May 1992, p.56)

Prepared and submitted by Amy Ullrich, Managing Editor, SAIL Magazine, Newton, MA

PURCHASING A BOAT

Why buy a boat?

Beyond the simple and obvious response, "Because sailing is fun!" answering this question will help your students define what type of sailing they want to pursue, and by so doing, determine the kind of boat that will best suit their needs.

- **For racing** -- At one end of the spectrum, this could mean focusing on a large, one-off, custom racing design. At the other, it could mean a small or midsize production class racing boat or a stock racer/cruiser.
- **For coastal or inland cruising** -- Among the many well-equipped production boats designed for protected-water sailing on the market today, there are unlimited choices in almost every size range.
- **For ocean passage making or extended cruising** -- Strength, seaworthiness and load-carrying capacity are crucial elements, as are size, spaciousness and level of live aboard comfort.

New or used?

There are advantages to both. One determining factor is cost. How much boat can you afford?

- **New boats** -- offer state-of-the-art design and technology, and some allow for owner customization of the interior as the boat is being built. However, initial cost and the cost of optional gear is higher than that of a used boat.

- **Used boats** -- are less expensive for comparable features than new boats. Often they have been completely fitted out by the previous owner and gear and equipment is usually either included in the overall sail price, or negotiable. May cost more to maintain and repair than a new boat.

Where to begin?

Once the type and size of boat has been decided on, and before a buyer begins seriously looking, he or she should prepare a budget and decide on a price range. In addition to boat-loan payments, prospective buyers should budget for insurance, slip or mooring space, annual haulout and storage (in colder climates) including an additional charge for pulling and storing the rig. If a boatyard will be maintaining

and servicing the boat, prospective buyers should also budget for annual maintenance tasks, including bottom painting, bright work, and preparing the engine and water system. Even do-it-yourselfers should be aware of the cost of maintenance supplies before they buy. The initial cost of basic gear and equipment (often included in the selling price on pre-owned boats) should also be taken into account. Talk to area boatyards and other boat owners, or browse marine supply centers, to help determine costs in the area where the boat will be sailed.

- **Decide on a price range** that is REALISTIC for you.
- **Rule of thumb** to remember: The annual cost of maintaining a boat is equal to about 10 percent of its initial cost.

BUYING A NEW BOAT

Where to look?

- **Boat reviews** -- read and compare various sailing magazines' evaluations and on-water tests of new boats. Clip and file the information along with material obtained directly from each builder.
- **Boat shows** -- held around the country allow hands-on comparison and inspection of latest models of new boats. Serious buyers should board, inspect and compare as many boats in their type, price and size range as possible, and talk to dealers or builders at the show. Carry a checklist to fairly compare different boats.
- **Boat dealers** -- sell new boats and may represent one or several different manufacturers. May have new models available for inspection, depending on the production agenda of each builder. A dealer should show you all parts of the boat in detail, and if possible arrange a test sail, and advise you of options not included in the base price of the boat (this can increase the sale price anywhere from 10 to 40 percent). The dealer also should discuss warranties, financing options, service and long-term value of the boat. Finally, the dealer should prepare the purchase and sales agreement and, on the day of signing it, collect a deposit from you. When your boat is delivered from the factory it is the dealer's job to check it and deliver it to you in top shape. After delivery, the dealer handles warranty claims. Dealers also collect a commission paid by the builder.

What to look for?

Hull Exterior:

- **Fairness and finish** -- should be even, smooth. No bumps, hollows, waviness or evidence of interior structures or hardware. Even color, no drips or sags, unblemished and attractive. No "orange peel" effect.
- **Stripes** -- boot tops and cove stripes should appear to be part of the basic finish. Clean, sharp edges, smooth lines that conform to the hull shape.

Hull Interior:

- **Bulkheads** -- smooth, evenly bonded to hull. No sloppy woodwork.
- **Hull-deck joint** -- fasteners, with washers and backing plates, of adequate size, closely spaced. Evidence of bedding or resin ooze where joint was made. If hull/deck lay-up is thin, evidence of reinforcement (such as backing strip) along joint.
- **Thru-deck fittings** -- should be bolts, not screws, backed with plates and/or large washers
- **Saloon, galley, cabins** -- surfaces (including inside lockers, under berths) neatly finished. Joiner work even, not splintered. Drawers/doors open and close smoothly.

Deck/Cockpit/Superstructure:

- **Finish** -- same rules apply as to hull. Evenly applied non-skid on fiberglass decks and cabin top areas where crew will step. If teak, caulked to prevent leakage below.
- **"Feel"** -- when trod or bounced lightly upon, deck should be rigid -- no excessive flexing.
- **Hatches and lockers** -- Locker lids well-finished, substantial hinges/hasps. Hatch frames and hardware strong, in working order
- **Ports** -- small, inward-opening preferable, frames strong and well-drained, hardware functional.
- **Handholds** -- conveniently placed, strong, adequate number.

NOTE: New boats require a substantial investment. To protect that investment, it is highly recommended that new-boat buyers have boats professionally surveyed before they take delivery. (The buyer bears this cost). Before signing a purchase and sales agreement, make sure it contains the phrase "subject to survey. If any defects are uncovered, repair costs should be negotiated with the seller before completion of the sale. The "subject to survey" clause allows you to refuse delivery of a boat if the defects prove too numerous or too expensive. Refer to the box on page 9 for information on selecting a surveyor and cost.

BUYING A USED BOAT

Where to look?

- **Boat brokers** -- are, in most cases, the bridge between boat buyer and boat seller, unless an owner is selling the boat himself. A broker's specialty is used boats and he or she should have extensive knowledge of a wide variety of boats and possibilities. He or she should be able to help guide a buyer's choice of boat, locate it, help find a good surveyor, suggest financing options and help with legalities. After the deal is closed, the broker's responsibility ends. Commission is usually about 10 percent of the purchase price, paid by the seller.

- **Cruise the classifieds** -- Classified ads in marine magazines, specialty publications and local newspapers are all good sources of used boats for sale. Ads are usually either placed directly by the owner/seller, or by a broker.

- **Boatyards and backyards** -- Spend some weekend afternoons poking around local boatyards; there are usually several "for sale" signs. Buyers in the market should keep an eye out for boats for sale as they drive; often prospective sellers will simply park smaller boats on trailers in a visible spot and hang out a "for sale" sign.

What to look for?

Fiberglass boats are very durable. Cosmetics aside, in general, only the sails, rig, engine, electronics and plumbing wear out over time. Some of the same rules for comparing new boats apply to used boats, too, but here is a quick checklist to use when evaluating a used boat.

Hull Exterior

- **Lifelines and stanchions** -- are the stanchions securely bolted and bedded? If they wiggle when touched, it's not a good sign.
- **Hull** -- although older fiberglass may appear faded or chalky, this is a cosmetic problem that can be alleviated by cleaning and polishing, or in extreme cases, repainting the topsides. Look closely for hairline cracks or signs of actual damage. Check the boat's bottom for any signs of osmotic blistering, and for cracks or dings on the keel and rudder (especially along the leading edges) that may be evidence of prior damage.

Hull Interior

- **The cabin(s)** -- open accessible lockers and check the hull-deck joint. Look for signs of leakage: streaks or stains that could indicate the ingress of water. Check for signs of leakage on the interior of the hull hear the areas where stanchions are thru-bolted. Also check for signs of leakage inside the hanging locker(s) and at the mast step, if it is stepped through the cabin. If not, check the area inside the boat below the deck-stepped mast for signs of sagging or compression.. Excessive evidence of leaks is not a good sign.
- **The bilge** -- should be clean and free of oil, diesel fuel, mildew and mold.
- **Head and stove** -- should be in working order and well-maintained. Hoses and fittings should be double-clamped and in good condition. Most older boats will not have holding tanks installed, which are now required by law in many locales. If there is one, it's a plus -- they are costly to purchase and install.
- **The engine** -- a surveyor will be able to give specifics, but take a look at the boat's power plant to see if it shows signs of neglect. Engine flaws are almost always the result of poor maintenance, not defects in the power plants themselves.
- **The rig** -- check the rig carefully for signs of neglect or wear. Watch for: wobbly spreaders, a bent or dented mast, frayed rope halyards or "meat hooked" wire halyards/shrouds/stays, kinks in stays, bent or broken turnbuckles, worn halyard sheaves.
- **The sails** -- are there a sufficient number of sails for the type of sailing planned? If the boat will be actively raced, is there a spinnaker? Genoa and working jib? Sails should be in good repair, at least in good to fair shape. Watch for tears along seams, holes, and general signs of wear and tear.

NOTE: A professional survey is *absolutely essential* before the purchase of a used boat, since neither financing nor insurance can be procured without one. The buyer bears the cost, and prices vary according to locale, but in general run from $7 to $10 per foot. A broker can usually recommend a good surveyor, or the buyer can ask for references from banks and insurance companies. The National Association of Marine Surveyors (86 Windsor Gate Drive, North Hills, NY 11040 or the Society of Accredited Marine Surveyors (4163 Oxford Ave., Jacksonville, FL 32210) will supply a list of its members on request.

NEGOTIATING AND CLOSING THE DEAL

- **New boats** -- there is less room for negotiation with new boats than with used. Generally there is a boat "base price" plus options, which may or may not be negotiable. Options can increase the sale price anywhere from 10 to 40 percent. Dealers may be willing to negotiate.
- **Used boats** -- are usually listed at a higher price (sometimes as high as 10 to 20 percent) than the owner expects to get, unless the word "firm" appears near the listed price. A broker may know how flexible an owner is; in general, the buyer is expected to make an initial offer that's lower than what he or she is willing to spend. The owner makes a counter offer, and, the process continues until a deal is made -- or not.

Once the offer is made and accepted, subject to a **test sail** (as agreed upon by buyer and seller/broker or buyer and dealer/builder) and a **survey** (an absolute MUST for used boats), a **deposit**, usually 10 percent of the agreed upon price, is given and a **yacht purchase agreement** similar to that used in real estate is signed by both parties, subject to the outcome of the test sail (if agreed upon) and the survey, in the case of used boats. The "earnest money" should be refundable if a buyer elects not to purchase after the survey or sea trial, and should be placed in an escrow account or with a reputable third party such as an attorney for safekeeping.

Registration vs. documentation

- **Registration** -- much like automobile registration, this means the boat is registered with a state government. There are title and non-title states, but both will issue a certificate of registration for the boat. Title states will also issue a title, which must accompany the registration when the boat is sold. In non-title states, the registration certificate is proof of ownership.
- **Documentation** -- boats registered with the federal government are considered to be documented. Such a boat is listed with the U.S. Coast Guard, which is the agency of the U.S. government that handles vessel registration. Some lenders may require that a boat be documented to provide financing. A boat can be both registered and documented.

The closing: points to remember

Registered Vessels:

- **The Hull Identification Number (HIN)** -- check to make sure the number stamped into the hull of the boat is the same number that appears on the registration or title.
- **Bill of sale** -- may be necessary in some states to close. The seller's signature should be notarized.

Documented Vessels:

- **Employing an agent** --since transferring ownership of documented boats can be complicated, some buyers employ a documentation agent to handle the closing, for a fee (about $200, plus government fees). Documentation agencies are private firms who know state, federal and foreign registration requirements. Look in the Yellow Pages under "Documentation" or "Boat Documentation".

If there is an outstanding bank loan on a boat being sold, the seller must pay it off before the title can pass to the new owner.

Paying sales tax

The majority of state governments impose a sales tax on new and used boats. If the buyer lives in such a state and registers the boat there, he or she will have to pay the sales tax.

CREATIVE BOAT BUYING

For creative buyers, there are some other options for becoming a boat owner.

- **The charter management option** -- the expense of buying a new boat can be defrayed by putting the yacht in a charter fleet. Many charter companies advertise this alternative in sailing publications and at boat shows. Obtain and read each company's literature, talk to representatives and compare deals.

- **The partnership alternative** -- One way to buy the boat of your dreams is to do it in company. Choose a partner carefully, establish a common ground, and sign a partnership agreement that has been drawn up by an attorney with the partners' input.

FURTHER READING

Books:

How To Buy A Sailboat by Hewitt Schlereth (W.W. Norton & Co., New York, London). Everything buyers need to know, in one well-organized volume.

How To Buy The Best Sailboat by Chuck Gustafson (Hearst Marine Books, New York, NY)

How To Buy, Own And Sell A Boat (Without Going Broke) by Schneider & Woodwell (ProStar Publications, Los Angeles,CA)

Boating For Less: How To Save Money When Buying, Owning And Selling Your Power Or Sailboat by Steve Henkel (International Marine Publishing, Camden, ME)

Simpson On Second-Hand Boats by Andrew Simpson (Waterline Books, Shrewsbury, England, UK)

Mauch's Sailboat Guide -- Specifications, Interiors And Illustrations On Over 350 New And Used Sailboats by Janet Mauch (Oceanside Publishing, Jacksonville, FL:)

Surveying Fiberglass Boats: A Step By Step Guide For Buyers by Hewitt Schlereth (International Marine Publishing, Camden, ME)

Articles:

"Buying A New Boat" by Hewitt Schlereth (*Cruising World*, October 1986). Once the choices are narrowed down, this article tells how to proceed.

"Closing The Deal" by Tor Pinney (*Cruising World*, October 1994). Some advice for both buyers and sellers.

"The Charter-Management Option" by Bernard Wideman (*Cruising World*, October 1990). How to defray the costs of a new boat by buying through a charter company's program.

"Own A Piece Of The Yacht" by Mark Wilson. (*Cruising World*, October 1993). An examination of the charter-management alternative.

"The Partnership Alternative" by Dexter and Paula Odin (*Cruising World*, October 1990). Some guidelines for purchasing a boat with a partner or partners.

Prepared and submitted by Lynda Morris Childress, Managing Editor, Cruising World Magazine, Newport, RI

APPENDIX

BASIC CRUISING CERTIFICATION

To responsibly skipper and crew an auxiliary powered cruising sailboat during daylight hours within sight of land in moderate wind and sea conditions.

Recommended Equipment: It is recommended that Basic Cruising Certification courses and examinations be conducted on 23' to 35' sloop-rigged cruising monohull keelboats with auxiliary power and with adequate equipment inventory to complete all of the required certification outcomes.

Prerequisite: The prerequisite for Basic Cruising Certification is Basic Keelboat Certification or successful completion of a Basic Keelboat Certification equivalency examination.

Certification Requirements: Basic Cruising Certification requires the successful completion of the following knowledge and skill requirements. These requirements are expected to be performed safely with confident command of the boat in a wind range of 5 to 15 knots. Some regions may have stronger prevailing conditions, which are acceptable if the candidate can safely control the boat, and be aware of their limitations in these conditions. The certified candidate will be able to skipper a keelboat up to 30 feet in length.

PREPARATION TO SAIL:

Skills:

1. Demonstrate ability to recognize and forecast prevailing local weather conditions
2. Perform an inspection of running rigging, standing rigging and hull integrity.
3. Check the inventory, location and operation of required safety equipment.
4. Check the auxiliary power systems: location and operation of engine controls, engine mechanical and fluids check, transmission controls, ventilation system and cooling system.
5. Check the electrical system: main battery switch, electrical control panel, battery fluids and battery terminals.
6. Check the bilge pump system: operation of manual and electrical pumps, intake maintenance and bilge pump alarms.
7. Check the head systems: location of controls, equipment operation, holding tanks, and proper setting of valves.
8. Check the fresh water system: adequate quantity, operation of manual and electrical pumps, and proper setting of valves.
9. Check the anchoring system: anchors, shackles, rodes, chafing equipment, and windlass.
10. Check all other equipment specific to your boat not indicated above.

CREW OPERATIONS AND SKILLS:

Knowledge:

1. Describe typical crew responsibilities and communications while aboard an auxiliary powered cruising sailboat.
2. Explain weather recognition and forecasting techniques for a two to three day period.
3. Explain the sequence for determining blocked engine cooling system circulation.
4. Understand the different types and operation of stoves, and fuel systems.
5. Be familiar with the use of a float plan.

Skills:

1. Demonstrate winch operation and procedure for clearing a fouled winch.
2. Demonstrate tying and use of knots: clove hitch, two half hitches, sheet bend and rolling hitch. Review stopper knot, bowline, cleat hitch and sail lashing knot.
3. Demonstrate how to heave a line.
4. Demonstrate the use of sail controls: halyards, sheets, traveler, cunningham/downhaul, outhaul, adjustable backstay (if applicable), boom vang, leech lines, jib fairleads and boom toppinglift.
5. Demonstrate the operation of a VHF radio: operation of controls, channel usage, call sign, weather channels, and simulate an emergency call.

SAILING THEORY:

Knowledge:

1. Describe sailboat dynamics: Center of Effort, Center of Lateral Resistance, and effects and influences of Lee and Weather Helm.
2. Describe real and apparent wind, and their relationship to each other.

LEAVING THE DOCK OR MOORING:

Knowledge:

1. Understand the effects of wind, tide and currents in relation to the boat and surrounding area, while preparing to get underway.
2. Describe the differences and alternatives for leaving under power in upwind, crosswind and downwind situations.

Skills:

1. Demonstrate appropriate helmsman and crew coordination and skills for departure under power suitable to the conditions: line handling, casting off, fending off, and boathandling for departure suitable to the conditions.
2. Demonstrate the use of dock lines for boat control while departing.
3. Demonstrate stowing of dock lines and fenders.

BOAT CONTROL IN CONFINED AREAS:

Skills:

1. Demonstrate in close quarters under power: speed and momentum control, windage and prop walk control, and command of the crew.
2. Demonstrate ability to maneuver under sail in close quarters: short tacking and controlled jibes.
3. Demonstrate a recovery plan for an engine failure in a crowded and busy harbor.

NAVIGATION (PILOTING):

Knowledge:

1. Be familiar with magnetic influences that may disrupt compass readings.
2. Define true and magnetic compass readings and application of variation and deviation.

Skills:

1. Demonstrate ability to identify chart symbols and corresponding visual observations.
2. Demonstrate basic dead reckoning: plotting course and position, calculating time/speed/distance, taking bearings and fixes, and plotting danger bearings.

NAVIGATION RULES, INTERNATIONAL-INLAND:

Knowledge:

1. Know the Navigation Rules, International-Inland, Rules 4 through 10 for steering and sailing.
2. Know how to access the Navigation Rules, International-Inland, Rules 20 through 31 to identify and use dayshapes, and Rules 32 through 38 to identify and use sound signals.

BOAT CONTROL IN OPEN WATER:

Knowledge:

1. Explain the advantages of "working to weather" and in gaining an upwind advantage.

Skills:

1. Demonstrate ability to steer a compass course with changes in course to a given destination.
2. Demonstrate helm and boat control in a variety of wind and sea conditions.

HEAVY WEATHER SAILING:

Skills:

1. Demonstrate proper reefing techniques: determining when to reef, roller furling or changing headsails, reefing the mainsail, dropping sails, shaking out a reef, and rehoisting underway.
2. Demonstrate helm and boat control while sailing under shortened sail.

OVERBOARD RECOVERY METHODS:

Knowledge:

1. Understand the Quick-Stop, Lifesling-type, and Quick-Turn overboard recovery methods under sail to include: constant visual contact with the victim, communications, recovery plan, sequence of maneuvers, boathandling, course sailed, pickup approach, coming alongside the victim (or simulated object), and bringing the victim aboard.
2. Explain when overboard recovery should be done under power and the inherent dangers.

Skills:

1. Properly demonstrate one of the above overboard recovery methods, which is most appropriate for: your sailing ability, boat type, crew experience, wind and sea conditions, and maintaining constant visual contact with the victim.

SAFETY AND EMERGENCY PROCEDURES:

Knowledge:

1. Describe recovery methods after going aground.
2. Be familiar with fire fighting equipment on board: regulations, types, location and operation.
3. Be familiar with the location and operation of emergency steering system and boat control during failure of the steering system.
4. Understand towing techniques: maneuvering onto a tow, handling and securing a towline, chafing protection, boat speed, dropping off a tow, and communications.
5. Describe the function of lifelines and pulpits.
6. Explain proper fueling techniques and potential hazards.
7. Explain the purpose and use of a radar reflector.
8. Be familiar with US Coast Guard safety requirements for auxiliary powered vessels.
9. Be familiar with at least six distress or emergency signals.
10. Explain thr proper procedures for protection against lightning strikes.

Skills:

1. Simulate procedure and operation of VHF radio in various emergency situations.
2. Simulate failure of steering system, and demonstrate steering and boat control with sails.

ANCHORING TECHNIQUES:

Knowledge:

1. Explain different types of anchors and various bottom conditions suited for each type.
2. Explain how to determine the required scope of an anchor rode.
3. Describe accepted etiquette when anchoring in the vicinity of other boats.

Skills:

1. Select an anchorage, and demonstrate appropriate helmsman and crew coordination and skills for properly anchoring with a single anchor under power.
2. Demonstrate appropriate helmsman and crew coordination and skills for retrieving your anchor under power.

RETURNING TO THE DOCK OR MOORING:

Knowledge:

1. Describe the differences and alternatives for docking under power in upwind, crosswind, and downwind situations.

Skills:

1. Demonstrate appropriate helmsman and crew coordination and skills for arrival under power suitable to the conditions: boathandling, deploying fenders, stopping and tying up.
2. Demonstrate appropriate helmsman and crew coordination and skills for arrival under sail suitable to the conditions: boathandling, deploying fenders, stopping and tying up.

SECURING THE BOAT PROPERLY:

Skills:

1. Demonstrate stowing of sails, rigging and equipment. Thoroughly clean the boat, and install any covers and dock power equipment.
2. Check both the electrical and bilge systems for dock operation.
3. Check the locks on companionway, lockers and hatches. Make a final check of dock lines, spring lines and fender placement.

BAREBOAT CRUISING CERTIFICATION

To responsibly skipper, crew or bareboat charter an inboard auxiliary powered cruising sailboat within sight of land to a port or an anchorage during daylight hours in moderate to strong wind and sea conditions.

Recommended Equipment: It is recommended that Bareboat Cruising courses and examinations be conducted on 30' to 45' sloop-rigged cruising monohull keelboats with wheel steering and auxiliary diesel power, and with adequate equipment inventory to complete all of required certification outcomes.

Prerequisite: The prerequisite for Bareboat Cruising Certification is Basic Cruising Certification or successful completion of a Basic Cruising Certification equivalency examination.

Certification Requirements: Bareboat Cruising Certification requires the successful completion of the following knowledge and skill requirements. These requirements are expected to be performed safely with confident command of the boat in unfamiliar waters with a wind range of 15 to 25 knots. Some regions may have stronger prevailing conditions, which are acceptable if the candidate can safely control the boat, and be aware of their limitations in these conditions. The certified candidate will be able to skipper a keelboat up to 40 feet in length.

PREPARATION TO SAIL:

Knowledge:

1. Understand the sail inventory and explain what selection of sails would be made for various conditions.
2. Be familiar with how to prepare a detailed passage plan and crew list.
3. Understand the typical procedures and responsibilities for bareboat chartering for both the charter company and the charter client.
4. Determine the vessel's fuel capacity, fuel consumption and cruising range under power.
5. Be familiar with all required documentation for crew and vessel nationally and internationally.

Skills:

1. Demonstrate weather forecasting for your passage and a passage plan.
2. Check the sail inventory and select the appropriate sails for the conditions.
3. Check the location and operation of all required safety equipment.
4. Perform and describe the need for daily checks of engine mechanicals and fluids, manual and electrical bilge systems, and the electrical, mechanical and water systems aboard the boat.
5. Perform a complete check and demonstrate safe use of galley equipment: stove and oven, fuel system and valves, cooking utensils and provisions inventory. Explain your provisions list and galley assignments.
6. Check the security and operation of all hatches, ports and companionways.
7. Check the inventory and condition of bimini tops, cockpit tents and dodgers.
8. Check the inventory and location of all tools and spare parts.
9. Check the location, condition and operation of dingy and outboard motor.
10. Check the inventory of required charts, cruising guides and navigation tools.
11. Complete a thorough check of the entire vessel and understand your liabilities as a bareboat charter customer according to your contract with the charter company.

CREW OPERATIONS AND SKILLS:

Knowledge:

1. Understand how to safely go aloft and explain the reasons for doing so.
2. Describe common etiquette and courtesies while cruising in foreign waters.
3. Be familiar with proper rafting techniques at docks and anchorages.

Skills:

1. Demonstrate a comprehensive crew indoctrination and plan of responsibilities.
2. Check the location and operation of the emergency steering equipment.

LEAVING THE DOCK OR MOORING:

Skills:

1. Demonstrate lashing of the dinghy on deck or securing it for towing.
2. Demonstrate appropriate helmsman and crew coordination and skills for leaving the dock under power in upwind, downwind and crosswind conditions.

BOAT CONTROL IN CONFINED AREAS:

Skills:

1. Demonstrate a recovery plan for an engine failure in a crowded and busy harbor.

NAVIGATION (PILOTING):

Knowledge:

1. Understand how to use tide and tidal current tables and predictions to include secondary station correction, state of tide and tidal current at any time, the use of the rule of twelfths, and application of set and drift to course plotting and determination.
2. Be familiar with considerations, responsibilities and special techniques for restricted visibility navigation.
3. Understand visual observations of water depth and conditions by color and darkness of the water.
4. Understand the fundamental operation of Loran or GPS to locate a position of latitude and longitude.
5. Be familiar with publications such as charts, cruising guides, coast pilots and light lists.

Skills:

1. Demonstrate the correct use of a hand bearing compass and a ship's compass.
2. Demonstrate navigation techniques for: plotting a DR course with time/speed/distance calculations. Fix a position using lines of position, estimating position, use of danger bearings and depth soundings. Use accepted plotting and labeling techniques.
3. Demonstrate the correct use of a ship's log.
4. Demonstrate the calculation and use of variation and deviation.

BOAT CONTROL IN OPEN WATER:

Knowledge:

1. Describe a plan of action if your vessel has fouled its propeller, under power with sails stowed, near a dangerous lee shore in strong winds.
2. Describe a plan of action having run solidly aground in moderate conditions on a descending tide.

HEAVY WEATHER SAILING:

Knowledge:

1. Describe the indication of an approaching squall or storm, and plan of action to remain safe aboard the boat at sea, or when it would be appropriate to seek a port of refuge.
2. Understand heaving-to in heavy weather and explain the considerations for crew safety.

Skills:

1. Demonstrate shortening sail to depower, and explain effects on balancing the boat.
2. Demonstrate the use of a boom preventer and explain overcoming its inherent dangers.
3. Demonstrate heaving-to in heavy weather conditions.

OVERBOARD RECOVERY METHODS:

Knowledge:

1. Be familiar with available equipment and charter company recommendations for overboard recovery.
2. Understand procedures for overboard recovery in a larger cruising boat in unfamiliar waters and with a crew that you might not sail with regularly. Understand the Quick-Stop, Lifesling-type and Quick-Turn overboard recovery methods under sail to include: constant visual contact with the victim, communications, recovery plan, sequence of maneuvers, boathandling, course sailed, pickup approach, coming alongside the victim (or simulated object), and bringing the victim aboard.
3. Explain when overboard recovery should be done under power and the inherent dangers.

Skills:

1. Properly demonstrate one of the above overboard recovery methods under sail, which is most appropriate for: your sailing ability, boat type, crew experience, wind and sea conditions, and maintaining constant visual contact with the victim.

SAFETY AND EMERGENCY PROCEDURES:

Knowledge:

1. Describe a plan of action for an engine failure, and for a steering failure.
2. Describe a plan of action if you suspect that your vessel is in danger of sinking, and you have a liferaft aboard. Describe the function of an EPIRB and other safety equipment.
3. Describe a plan of action if your vessel has a broken through-hull fitting or has been holed.

Skills:

1. Demonstrate use of the emergency steering system.

ANCHORING TECHNIQUES:

Knowledge:

1. Describe the different procedures for anchoring with two anchors under power and sail.
2. Describe the procedure for unfouling crossed anchors, recovering an anchor from under another boat, and recovery procedures for dragging while at anchor.
3. Understand the advantages and procedures for: anchoring bow and stern, anchoring with two bow anchors, anchoring on a Bahamian style mooring and a Mediterranean mooring.

Skills:

1. Select an anchorage and demonstrate appropriate helmsman and crew coordination and skills for anchoring with two anchors under power using one of these methods: anchoring bow and stern, anchoring with two bow anchors, and anchoring on a Bahamian style mooring.
2. Demonstrate your ability to pick up a mooring.
3. Demonstrate appropriate helmsman and crew coordination and skills for retrieving your anchor under power.
4. Demonstrate the use of an anchor trip line.

RETURNING TO THE DOCK OR MOORING:

Knowledge:

1. Describe the legal responsibilities and common courtesies when entering a foreign port.
2. Understand the precautions, and how to dock your charter vessel under sail.

Skills:

1. Demonstrate appropriate helmsman and crew coordination and skills for arriving at the dock under power in upwind, crosswind and downwind conditions.
2. Demonstrate appropriate helmsman and crew coordination and skills for arriving at the dock under sail in adverse conditions (actual or simulated).

SECURING THE BOAT PROPERLY:

Knowledge:

1. Describe the responsibilities of the charter customer and the charter company when the boat is returned.

Skills:

1. Demonstrate the correct procedure for returning the charter boat in the same condition that it was chartered, and complete a charter check-in report on the condition of the vessel.

COASTAL NAVIGATION CERTIFICATION

To properly use traditional navigation techniques and electronic navigation for near coastal passage making.

Required Equipment: It is required that Coastal Navigation courses and examinations be conducted in a classroom environment, and with adequate equipment inventory and publications to complete all required certification outcomes.

Prerequisite: There is no prerequisite for Coastal Navigation Certification.

Certification Requirements: Coastal Navigation Certification requires the successful completion of the following knowledge and skills. These requirements are expected to be performed with confidence in the subject matter and a high degree of accuracy.

INTRODUCTION TO METHODOLOGY:

Knowledge:

1. Understand buoyage systems and aids to navigation.
2. Be familiar with interpretation of chart symbols.
3. Describe the use and operation of electronic navigation instruments: knotmeters, knotlogs, fathometers, wind speed and direction finders, Sat-Nav, Loran, GPS, Radar, VHF radio, Weatherfax, and personal computers.

Skills:

1. Identify visual observations and landmarks according to chart symbols.
2. Perform simple orienting, direction and distance calculations on a nautical chart.
3. Demonstrate the use of true and magnetic compass direction with the correct conversion of course through application of variation and deviation.

PUBLICATIONS:

Knowledge:

1. Be familiar with sources for and use of appropriate publications to include: NOAA Chart #1, Coast Pilots, Light Lists, Tide and Tidal Current Tables, Navigation Rules, Local Notice to Mariners, Federal Requirements for Recreational Boaters, and local rules and regulations.
2. Know how to select appropriate harbor and coastal NOAA charts for use in the operational area using the chart catalog.
3. Be familiar with the user's manuals for all of the electronic instruments aboard your vessel.

Skills:

1. Identify local landmarks and aids to navigation using NOAA Chart #1.

NAVIGATION EQUIPMENT:

Knowledge:

1. Understand the navigational use of: a plotter, parallel rules, dividers, a clock, a ship's compass, a hand bearing compass, a fathometer, a knotmeter, a knotlog, and binoculars.
2. Understand the fundamental operation of Loran and GPS to locate a position of latitude and longitude.
3. Understand the operation of electronic instruments to: record your position, boat speed, wind speed and direction, water depth, weather information and way points.
4. Understand how to prepare a weather forecast based on the information received on electronic instruments and show how this may effect your navigational planning.

CHARTWORK:

Knowledge:

1. Understand the effects of leeway.

Skills:

1. Determine your position on a chart based on visual observations, then confirmed by traditional navigation (piloting) techniques.
2. Plot a DR course based on time/speed/distance calculations, and continue the plot through several course and speed changes.
3. Demonstrate the use of set and drift. Determine current from known set and drift, then plot an estimated position. Plot the required course to counter the known set and drift, and leeway.
4. Plot a fix using two or more bearings on different objectives, and a fix using at least one range (transit) as a line of position.
5. Plot a running fix.
6. Confirm your plotted positions using Loran or GPS as a secondary navigation device.
7. Demonstrate the use of bow and beam bearings, doubling the angle on the bow, and their limitations and dangers.
8. Demonstrate the application of danger bearings and the danger circle.
9. Use proper plotting and labeling work in all chartwork using accepted navigation convention.
10. Demonstrate the correct use of a ship's log.

NAVIGATION AIDS:

Knowledge:

1. Understand the use of Aids to Navigation in your chartwork.

COASTAL PASSAGE MAKING CERTIFICATION

To responsibly skipper and crew an inboard auxiliary powered cruising sailboat for coastal or offshore passages in strong to heavy conditions, including zero visibility and nighttime in unfamilar waters out of sight of land.

Recommended Equipment: It is recommended that Coastal Passage Making Certification courses and examinations be conducted on 30' to 50' sloop-rigged cruising monohull keelboats with wheel steering and auxiliary diesel power, and with adequate equipment inventory to complete all of the required certification outcomes.

Prerequisites: The prerequisites for Coastal Passage Making Certification are Bareboat Cruising, Coastal Navigation and Electronic Navigation Certifications or successful completion of equivalency examinations for these certifications.

Certification Requirements: Coastal Passage Making Certification requires the successful completion of the following knowledge and skill requirements. These requirements are expected to be performed safely with confident command of the boat in unfamiliar waters with a wind range of more then 25 knots. The candidate must safely control the boat, and be aware of their limitations in these conditions.

PREPARATION TO SAIL:

Knowledge:

1. Develop a very detailed passage plan to include long term weather forecasts, strategies and tactics for all potential conditions, and navigation strategies.
2. Coordinate the crew with a watch schedule and responsibilities during the passage.
3. Describe the minimum and prefered fresh water requirements for an extended passage.

Skills:

1. Inspect the vessel for an extended passage: hull, spars, deck, rigging, hardware, sails, engine, internal mechanical and electrical systems, head systems, fresh water systems, navigation systems, anchoring systems, galley and provisions, and stowage.
2. Check the inventory, locate and inspect all required safety and emergency equipment, tools and spare parts.
3. Perform the correct lashing of the liferaft or dinghy, and other necessary equipment for deck stowage.
4. Check the inventory of sails and their condition for an extended passage, and justify your selection based on the expected sailing conditions.

WEATHER FORECASTING:

Knowledge:

1. Be familiar with the Beaufort Scale of Wind Forces.
2. Describe six types of cloud formations and weather conditions associated with each.
3. Describe the weather effects on, and the function of a barometer and thermometer.
4. Explain the effects of geography on prevailing weather conditions, high and low pressure systems, warm and cold fronts, and the differences of strorms, squalls, gales and hurricanes.
5. Describe the different factors responsible for at least four distinct types of fog.
6. Identify at least five sources for gathering accurate weather information.

CREW OPERATIONS AND SKILLS:

Knowledge:

1. It is recommended to have current First Aid and CPR certifications.
2. Demonstrate a comprehensive knowledge of onboard systems and their maintenance.
3. Be familiar with different types of cruising spinnakers

Skills:

1. Demonstrate a comprehensive understanding and correct operation of advanced electronics such as: SSB radio, Loran, GPS, Sat-Nav, radar and Weatherfax.
2. Demonstrate a high level of general seamanship skills.
3. Demonstrate ability to direct crew and make decisions to benefit the passage goals in consideration of long term weather and sea conditions, crew welfare, proper navigation, and safety considerations.
4. Demonstrate the correct hoisting, trimming, dousing and packing of a cruising spinnaker.

LEAVING THE DOCK OR MOORING:

Skills:

1. Develop a departure plan for the vessel and crew, and demonstrate appropriate helmsman and crew coordination and skills for leaving the dock under sail.

BOAT CONTROL IN CONFINED WATERS:

Skills:

1. Demonstrate boat control in close quarters under sail in adverse conditions (actual or simulated) as you leave the harbor.

NAVIGATION RULES, INTERNATIONAL-INLAND:

Knowledge:

1. Be familiar with the application of all the Navigation Rules, International-Inland.

NAVIGATION (PILOTING):

Skills:

1. Demonstrate the proper use of a thoroughly documented ship's log.
2. Demonstrate use of tide and tidal current diagrams.
3. Demonstrate use of light lists and coast pilot publications.
4. Demonstrate the correct method of taking a running fix.
5. Demonstrate the use of navigational way points.
6. Demonstrate confirmation of chartwork with electronic navigation equipment such as Loran or GPS.
7. Plot danger bearings.

BOAT CONTROL IN OPEN WATER:

Knowledge:

1. Describe the conditions and dangers that would cause your vessel to take a knockdown, broach, pitchpole, roll or capsize.

Skills:

1. Demonstrate leadership and navigation skills during a minimum twenty-five nautical night passage, and anchoring in unfamiliar waters at night.
3. Demonstrate command and control of the vessel in difficult wind and sea conditions.

HEAVY WEATHER SAILING:

Knowledge:

1. Be familiar with the operation of sea anchors and drogues.
2. Explain the differences of various storm sails, and reason for their selection.
3. Describe the reasons and procedures for storm tactics such as: heaving-to, lying ahull and running off.

Skills:

1. Demonstrate deckwork performance using a safety harness and jacklines.

OVERBOARD RECOVERY METHODS:

Knowledge:

1. Understand procedures for overboard recovery in a larger cruising boat in unfamiliar waters and in any conditions. Understand the Quick-Stop, Lifesling-type, and Quick-Turn overboard recovery methods under sail: constant visual contact with the victim, communications, recovery plan, sequence of maneuvers, boathandling, course sailed, pickup approach, coming alongside the victim (or simulated object), and bringing the victim aboard.
2. Explain when overboard recovery should be done under power, and the inherent dangers.
3. Describe search patterns.

Skills:

1. Properly demonstrate one of the above overboard recovery methods under sail, which is most appropriate for your sailing ability, boat type, crew experience, wind and sea conditions, and maintaining visual contact with the victim. Perform overboard recovery during both daylight and nighttime conditions.

SAFETY AND EMERGENCY PROCEDURES:

Knowledge:

1. Describe emergency procedures in the event that your vessel has been holed by a submerged object.
2. Explain the proper procedures for protection against lightning strikes.
3. Describe the procedures involved in an air rescue operation.

Skills:

1. Simulate a plan of action should your vessel be in danger of sinking due to fire, water intake, dismasting or other disaster. Demonstrate all safety considerations given the situation.

ANCHORING TECHNIQUES:

Knowledge:

1. Describe the conditions and appropriate plan of action for storm anchoring.
2. Describe an anchor watch schedule and explain the watch's responsibilities.

RETURNING TO THE DOCK OR MOORING:

Knowledge:

1. Describe the difficulties and procedures of returning to the dock in adverse conditions.

Skills:

1. Develop an approach plan for the vessel and crew, and demonstrate appropriate helmsman and crew coordination and skills for returning to the dock under sail.

SECURING THE BOAT PROPERLY:

Skills:

1. Coordinate the crew and demonstrate the stowing of equipment and cleaning of the vessel after returning to the dock.
2. Check the vessel before leaving the dock: determine and report any required maintenance, check dock lines, spring lines and fenders, check through-hull valves, electrical system, bilge pumps, and overall security of the boat.

CELESTIAL NAVIGATION CERTIFICATION

To navigate using celestial techniques and integrating celestial with traditional navigation.

Required Equipment: It is required that Celestial Navigation courses and examinations be conducted so as to demonstrate both theoretical (knowledge) and practical (skills) with adequate equipment inventory and publications to complete all required certification outcomes.

Prerequisite: The prerequisite forCelestial Navigation Certification is Coastal Navigation Certification or successful completion of a Coastal Navigation Certification equivalency examination.

Certification Requirements: Celestial Navigation Certification requires the successful completion of the following knowledge and skills. These requirements are expected to be performed with confidence of the subject matter and a high degree of accuracy.

INTRODUCTION TO METHODOLOGY:

Knowledge:

1. Be familiar with Celestial Navigation termonology and theory.
2. Understand how to prepare a Universal Plotting Sheet.
3. Be familiar with techniques for computing sight reductions on celestial bodies.
4. Understand how to determine latitude and longitude by sightings and sight reductions of celestial bodies.

Skills:

1. Plot the planets on a starfinder and align it to local latitude, longitude and time.
2. Obtain altitudes on the sun, stars and planets using a sextant.
3. Demonstrate a calculation for time of meridian passage, and calculate latitude from the observed meridian altitude of the sun.
4. Obtain a running fix from two celestial sightings seperated by at least one hour, which is accurate within ten nautical miles.
5. Demonstrate a standard noon sight reduction to obtain latitude.
6. Obtain latitude by a Polaris sight.
7. Calculate time of sunrise, sunset, and civil and nautical twilight.
8. Determine azimuths and altitudes of appropriate stars and/or planets at twilight, preparatory to taking sights.
9. Determine deviation of the ship's compass by use of a celestial body.
10. Demonstrate proficiency with the sextant to obtain accurate celestial body altitudes and perform necessary corrections

PUBLICATIONS:

Knowledge:

1. Be familiar with the contents and techniques for use of the Nautical Almanac and HO 249 Sight Reduction Tables.

NAVIGATION EQUIPMENT:

Skills:

1. Demonstrate the proper handling, operation and maintenance of a sextant.

CHARTWORK:

Skills:

1. Construct a Universal Plotting Sheet.
2. Calculate sight reductions by use of Sight Reduction Tables, and plot at least three of these lines of position on a Universal Plotting Sheet within one hour's working time. This fix must be accurate to within ten nautical miles.
3. Advance the line of position from a sun sight to a later sight, and plot a running fix.
4. Transfer a fix on a Universal Plotting Sheet to a nautical chart.

OFFSHORE PASSAGE MAKING CERTIFICATION

To responsibly skipper and crew an inboard auxiliary powered cruising sailboat to any destination worldwide.

Recommended Equipment: It is recommended that Offshore Passage Making courses and examinations be conducted on 35' or larger sloop-rigged cruising monohull keelboats with wheel steering and auxiliary diesel power, and with adequate equipment inventory to complete all required certification outcomes.

Prerequisites: The prerequisites for Offshore Passage Making Certification are Coastal Passage Making and Celestial Navigation Certifications or successful completion of equivalency examinations for these two certifications.

Certification Requirements: Offshore Passage Making Certification requires the successful completion of the following knowledge and skill requirements. These requirements are expected to be performed safely with confident command of the boat in unfamiliar waters with a wind range of 20 knots and greater. The passage must be a minimum of 600 nautical miles from start to finish with a minimum of 250 nautical miles to be sailed at least 50 nautical miles offshore. The candidate must safely control the boat, and be aware of their limitations in these conditions.

PREPARATION TO SAIL:

Knowledge:

1. Have a comprehensive knowledge of Celestial Navigation, Global Weather Patterns and Long Distance Passage Planning as a result of a shore based course.
2. Describe navigation planning and equipment, and resourse publication requirements for this type of long distance passage.
3. Describe the proper selection of a vessel, rigging, systems and mandatory equipment in relation to anticipated passage conditions.
4. Define requirements for crew selection such as experience, special skills and compatibility.
5. Describe personal preparation, clothing and equipment requirements.

Skills:

1. Prepare a plan for an open ocean passage of at least 600 nautical miles from start to finish. A minimum of 250 nautical miles must be sailed at least 50 nautical miles offshore.
2. Develop a comprehensive provisioning and galley duty plan.
3. Demonstrate a comprehensive check of the vessel, equipment and crew preparation.

CREW OPERATIONS AND SKILLS:

Knowledge:

1. Be familiar with materials and methods of sail repair and maintenance at sea.
2. Describe the different types and proper use of self-steering systems.

Skills:

1. Develop a primary and alternative watch schedule and duty roster for the skipper, navigator, crew, galley and ship's maintenance for the passage.
2. Demonstrate a plan of advanced weather forecasting: global weather patterns, high and low pressure systems, fronts, storms, squalls, gales and hurricanes, and various fog conditions.
3. Demonstrate common line splicing techniques.

LEAVING THE DOCK OR MOORING:

Skills:

1. Develop a departure plan for the vessel and crew, and demonstrate appropriate helmsman and crew coordination and skills for leaving a dock under sail in adverse (actual or simulated) conditions.

BOAT CONTROL IN CONFINED WATERS:

Skills:

1. Demonstrate boat control in close quarters under sail, with appropriate helmsman and crew coordination and skills in maximum adversity (actual or simulated).

NAVIGATION (PILOTING):

Skills:

1. Demonstrate proper celestial navigation techniques per the Celestial Navigation Certification as your only means of navigation for minimum period of twenty-four hours.
2. Maintain a continuous ship's log in a timely manner to include significant events, navigation entries and weather records.

BOAT CONTROL IN OPEN WATER:

1. Demonstrate decision making and boathandling skills for boat control in any wind and sea condition.

HEAVY WEATHER SAILING:

Skills:

1. Demonstrate or simulate boat control in adverse conditions with a sea anchor or drogue.
2. Demonstrate or simulate boat control in adverse conditions for heaving-to, lying ahull or running off.
3. Demonstrate or simulate boat control in adverse conditions using storm sails.

OVERBOARD RECOVERY METHODS:

Knowledge:

1. Understand procedures for overboard recovery in a larger cruising boat in unfamiliar waters and in any conditions, especially extremely adverse ones. Understand the Quick-Stop, Lifesling-type, and Quick-Turn overboard recovery methods under sail: constant visual contact with the victim, communications, recovery plan, sequence of maneuvers, boathandling, course sailed, pickup approach, coming alongside the victim (or simulated object), and bringing the victim aboard.

Skills:

1. Properly demonstrate one of the above overboard recovery methods under sail, which is most appropriate for your sailing ability, boat type, crew experience, wind and sea conditions, and maintaining constant visual contact with the victim. Perform overboard recovery in daylight, nighttime and adverse conditions.

SAFETY AND EMERGENCY PROCEDURES:

Knowledge:

1. Describe potential medical problems that might occur on this type of voyage, and proper treatment and inventory of supplies onboard. Also, explain action to be taken if advanced treatment, beyond the ability of the crew, is required.
2. Describe essential necessities, prefered items and proper procedures for survival and rescue in a liferaft in an open ocean not within sight of land.
3. Explain search and recovery procedures for a vessel in distress near your location.

Skills:

1. Simulate a plan of action should your vessel be in danger of sinking due to fire, water intake, dismasting or other disaster. Demonstrate all safety considerations given the situation.

SECURING THE BOAT PROPERLY:

Skills:

1. Demonstrate proper procedure and responsibility involved in cleaning, inspecting and reporting the return of a vessel after an extended voyage.
2. Check the vessel before leaving the dock: dock lines, spring lines, fenders, through-hull valves, electrical system, bilge pumps, and overall security of the boat.