

Orange Coast College presents:

# Safety at Sea

**Co-Sponsored by USYRU, Cruising World Magazine  
and West Marine**

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## On Personal Flotation Devices

### The Regulations

The regulations regarding lifejackets, or Personal Flotation Devices (PFDs), on pleasure boats are pretty simple. PFDs are divided into five categories, Type I through Type V:

If you operate a boat between 16 and 65 feet, you must have a Type I, II, III or V onboard for each person onboard, and a Type IV throwable device. If you have a boat under 16 feet, you need to have a Type I, II, III, IV or V for each person onboard. According to the Coast Guard, the Type I, II and III PFDs must be readily accessible, while Type IV PFDs must be immediately available. Type V Hybrid PFDs must be worn to be included in the vessel's PFD inventory.

### The Different Types of PFDs

This is our analysis of the Coast Guard approved PFD types:



**Type I – Offshore Life Jacket** – "...offers the most buoyancy and is also the most effective type in rough water." Has a minimum of 22 lbs of buoyancy. Will turn most wearers face up if unconscious. Bulky size makes it clumsy to wear all the time. Of the USCG approved types, this is the one that you want to wear when abandoning ship into cold water.

**Type II – Near Shore Life Vest** – "Best suited for general boating activities in calm waters." Least expensive approved PFD. 15.5 lbs of buoyancy. Not desirable for extended wear due to an uncomfortable feel. Will turn many wearers face up if unconscious. Inexpensive enough that you can have plenty of extras for unexpected guests. Pretty ineffective in rough waters.



**Type III – Flotation Aid** – Comfortable vest-style designs that encourage boaters to wear them all the time. 15.5 lbs of buoyancy. "The comfort, style and wearability of the Type IIIs is a trade-off for safety and buoyancy compared to Type I and Type IIs." Poor righting ability and head support. Recommended for inland waters and active boaters.

**Type IV – Throwable Device** – Designed to be thrown to a person in the water up to 40 feet away. Can be cushion, ring or horseshoe shape. Horseshoe buoys, although not nearly as effective as the Lifesling, are the best design. 18 to 20 lbs of buoyancy. Non-swimmers must wear one of the other types and not depend on a Type IV.

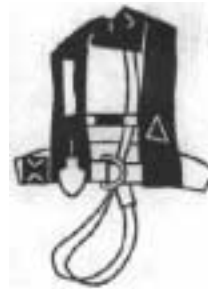


We do not recommend "life rings" except for pools, because the swimmer cannot wear or attach himself to the ring and they are tiring to hold onto. We like the "horseshoe" style devices the best.



**Type V – Special Use Device, Hybrid** – Have soft foam flotation which provides 7.5 lbs of buoyancy, and an inflatable bladder that increases the buoyancy to a minimum of 22 lbs – the same as the bulky Type I. Medium to high performance with good righting moment and head support. Meets Coast Guard approval only while being worn.

**Inflatable Life Vests – Not Coast Guard Approved!** Inflatable life vests, like those made by SOSpenders and Mustang, do not meet USCG requirements because the Coast Guard does not have a category for "pure" inflatables. You must carry the required number of approved devices in addition to the inflatable vests on board. We are strong supporters of inflatable vests, because of their high buoyancy and freedom of movement when worn. Non-swimmers, or children, must wear an automatically inflating version when on the water.



NOTE: Both Type V Hybrids and fully inflatable vests must be maintained by the user to insure that they will work as designed when needed. This means checking the CO2 cartridge and airholding ability of the bladder each season.

### Specific Recommendations by Application

There are many types of PFDs due to the diversity of boating activities that boaters participate in. A lifejacket that is ideal for a water-skier may be very inappropriate for an offshore sailor or a canoeist. The correct PFD for your type of boating will combine the flotation characteristics, comfort, styling and value that meets your needs.

How do you choose appropriate PFDs for your type of boating? After many years of selling a variety of PFDs, we recommend the following:

**Inland waters; powerboats:** Have as many Type II vests as you have persons onboard. For water-skiing or personal watercraft, use Type II vests with a sufficiently high impact rating. Non-swimmers should use a Type III vest for comfort and they should wear it. Fisherman can select from a variety of specialty vests with pockets for fishing paraphernalia. Use a Type IV cushion for a throwable device.

**Inland waters; sailboats:** Buy and wear more comfortable Type III vests like the West Marine Basic or Deluxe vests, or vests made by Stearns. They will provide more freedom of movement and comfort than Type II vests, and you'll look better, too. For infrequent extra guests, have a few Type IIs tucked away.

**Semi-protected waters; powerboats:** As the water gets rougher, you'll want to wear your lifejackets more frequently, and use ones with more flotation. High-quality float coats are an excellent choice for both flotation and warmth. Again, fishermen should consider the specialty fishing vests with pockets.

**Semi-protected waters; sailboats:** This is where comfort and less restriction are important. Sailors tend to be physically active, and need flotation devices that won't slow them down. Hybrid vests, like the models from Stearns, are comfortable yet provide 22 lbs of buoyancy when inflated. They are also warm and good-looking. Use a horseshoe buoy to meet your Type IV requirement. Remember that in man-overboard situations, the Lifesling is the best system available and should be aboard any boat that venture beyond calm waters.

**Offshore waters, Power and Sail:** Although they are not Coast Guard Approved, we have been strong advocates of fully inflatable PFDs for some time. They are unobtrusive when deflated, but a pull on their lanyard inflates them to a full 35 lbs of buoyancy. This extra buoyancy will keep your face above the waves and extend your survival time if rescue is not prompt. They are available in

automatic models, which inflate after being immersed for several seconds. Although expensive, we believe that inflatable PFDs combine the performance and wearability that makes them ideal for offshore sailors. You must carry one of the other types of Approved PFDs to meet the Coast Guard requirement, if you choose inflatable vests. We recommend Type Is, Type IIIs, Hybrids or Type III float coats.

### Selection Criteria for PFDs

How do you use your boat, and what is the water like? Ask yourself the following questions:

1. Are my crewmembers swimmers or non-swimmers? Non-swimmers will require a PFD that is comfortable for constant wear, and has sufficient buoyancy.
2. Is the water warm (70 degrees+), brisk (60 degrees+) or cold (less than 55 degrees)? Cold water quickly saps your body heat and causes hypothermia. Even warm water will do this eventually, but in cold areas like the Pacific Northwest, a high buoyancy PFD or a float coat will help you to fight hypothermia.
3. Is there a good chance of being rescued quickly? On popular lakes and rivers there tends to be plenty of boat traffic and therefore plenty of folks to lend assistance. Offshore, you need to be more self-sufficient, and wear more supportive, buoyant PFDs because your time in the water may be greater.
4. Are you involved in specialty boating activities like paddling, skiing, boardsailing, personal watercraft? These sports have specific requirements of mobility, impact protection, flexibility, etc. and have generated their own types of PFDs (which still meet Coast Guard requirements, of course...).
5. Do I boat in rough waters (especially short, choppy waves)? If so, wear the highest buoyancy PFD that you can find, so that your head stays above the waves.
6. Does my type of boating have a high potential for ending up in the water (water-skiing, personal water craft, Hobie Cats)? Wear a PFD designed for these specialized activities.

### Buoyancy Numbers

The Coast Guard minimum for adult PFDs is 15.5 pounds of buoyancy. What does this mean? This is the weight of water that is displaced when the PFD is completely submerged. Because a 170-pound man may only weigh 8 or 9 lbs when completely immersed in water, the modest buoyancy that PFDs provide is sufficient to keep most people afloat. Men with low body fat, who are big and muscular, will not be supported by a 15.5-pound buoyancy PFD, and may even sink while wearing it. This is why it is crucial that you try your PFD in a pool to see how it fits and floats.

More buoyancy will support your face higher out of the water, which keeps you from aspirating water in choppy conditions. This also lets you pull your legs to your torso to reduce heat loss – the so-called H.E.L.P. or Heat Escape Lessening Position. Although we realize the 22-pound buoyancy (or greater) PFDs are not fun to wear, they will extend your survival time in the water if you are not rescued quickly.

One option for the active boater is to buy an inflatable life vest. There are several high-quality vests on the market that provide 35 pounds of buoyancy when inflated, while being compact when not in use. They will not help you if you fail to pull their inflation cord, but can be orally inflated in feed be. Fully automatic-inflation is

available as an option – inflating your vest after seconds in the water. We think that inflatables are a great choice for offshore and active sailors and power boaters, but they are not suitable for non-swimmers.

### Factors Affecting PFD Performance

Various factors contribute to the “performance” of a life jacket. These are some important attributes:

1. Total buoyancy, measured in pounds (how much lead could the device support before sinking?)
2. Reserve buoyancy (after you are in the water, how hard is it to immerse you further?)
3. Freeboard (how far above the water is your mouth?)
4. Righting effort (do you turn face up automatically?)
5. Body inclination angle (tilted back is preferable)
6. “Wearability” or how little the device restricts your activities

Since PFD designs are necessarily a compromise, each type of PFD will have varying scores in these categories. A higher performance life jacket will score well on most of these attributes. For example, a Type I life jacket is very buoyant, provides good freeboard, etc., but is too bulky for active boating. A Type III will generally score poorly on each of these except wearability, but since it is much more likely to be worn by active boaters, you are more likely to have it on when you need it.

### Flotation Materials.

**AIREX\*** - the best material available. Very soft, flexible and comfortable. Does not absorb water, isn't affected by chemicals, etc. Provides extended hypothermia protection. Buoyant even when punctured or cut.

**ENSOLITE\*** - Right behind Airex. Soft, flexible and comfortable. Like Airex, Ensolite is not affected by chemicals and does provide extended hypothermia protection. It remains buoyant when punctured or cut.

**POLYETHYLENE** - Marginal at best. Because it is stiff it can be uncomfortable to wear for extended periods. Polyethylene is prone to mildew and odors and it will absorb water. This material offers very limited hypothermia protection.

**KAPOK** - This material is unsuitable for use in general wear applications since it is bulky, prone to mildew (almost instantaneously) and provides almost no protection against hypothermia. Kapok must be placed in sealed pockets which, when punctured, absorb water like a sponge. We recommend lifevests made with Kapok flotation only for backup or emergency use, not for extended or constant wear.

### On the Lifesling

One comment that we hear from time to time is that the Lifesling sounds great, but the technique is too complicated. There are several steps involved in a Lifesling recovery (that's why we print the instructions in the bag), but the important fact is that if the instructions are followed, there is an excellent chance of a MOB recovery. In the testing of the Lifesling prototypes, four hundred staged recoveries were made successfully. In all but four cases, the recoveries were made successfully. In those four failures, the participants were unable to handle the boat alone.

So, we emphasize again: practice with the Lifesling, and teach the technique to your first mate. The procedure may seem lengthy, but it works consistently and on a variety of vessels. Just as picking up

a mooring once seemed a remarkable feat of seamanship to most of us, recovering a man overboard can become Standard Operating Procedure if you practice a few times.



### On Safety Harnesses

If there were a Murphy's Law for rough water sailing, it would probably be that "Crewmembers tend to fall overboard when recovery will be the most difficult". Wear a harness when it's rough and look for these design features:

- It must be strong – weak harnesses are a real liability. Pot metal snaps and narrow webbing have no place in safety gear.
- The tether must have snaps at both ends so you can release the harness at your end. The tether material should be thick webbing instead of line so it doesn't roll under foot.
- It should be easy to put on and adjust.

### On EPIRBs

EPIRBs (Emergency Position Indicating Radio Beacons) are small transmitters that send out an emergency signal to rescue services. If you are a boater in need of assistance and are out of range of VHF communication, an EPIRB may be the ticket to summon help. Their use is limited to Mayday-type emergencies, where your vessel is in danger of sinking, or you have a medical emergency.

Conventional EPIRBs transmit on two recognized emergency frequencies in the VHF band – 121.5 MHz (civilian) and 243.0 MHz (military). MHz is the abbreviation for MegaHertz and it means one million times per second. These EPIRBs are known by the designations Class A, which automatically float free and turn on, and Class B, which are manually activated. These are primarily listened to by aircraft, since the signal is weak and travels line of sight. Only aircraft can "see" enough of the horizon to cover a reasonable amount of the ocean or land. Most aircraft are required to monitor this frequency when they are not actively talking on another channel.

In 1983, some satellites began to have the ability to listen on EPIRB frequencies as well. These satellites, operated by the USA, USSR, France, Canada, Sweden, Norway and the United Kingdom, cover the entire world, since they are in polar orbits. The American satellites are called SARSAT and the Russian versions are called COSPAS. They actually are small repeaters that are a part of larger weather satellites – the type that give us the nightly weather maps on TV. The only problem with this idea is that the satellites cannot store the EPIRB signal – they only transmit it when they hear it. This means that the satellite must be able to hear the beacon and be over one of seven LUTs (receivers) on the ground. Because almost all of the LUTs are in the Northern Hemisphere, a satellite cannot help you if you get into trouble in most areas of the Southern Hemisphere.

Two other problem with EPIRBs exist: 1. They suffer from a 95% false alarm rate – only about 3% of the signals are from true emergencies. 2. They do not identify the source of the emergency call.

To address the above problems, a new class of EPIRBs was developed. They are commonly called "406" EPIRBs because they transmit on a new frequency, 406 MHz. They have several advantages over the traditional Class A, B and C EPIRBs. The most important difference is that the SARSAT satellites listen and store the emergency message until they are over a ground station. They then re-transmit the signal to the receiver, which in turn notifies the rescue service in the country. This makes the system truly worldwide. Second, their signal has a code embedded in it like

Morse Code. This code is your personal ID# and as soon as the ground station receives it, they know who is in trouble, and what phone number to call to make sure that you really are in trouble. This reduces the false alarm rate to less than 5%. Third, the transmitter is very precise and much more powerful than the older style. This allows the satellite to calculate the position of the sender to about a one-mile radius which reduces search costs dramatically. Each of the 406 MHz EPIRBs also has a weak 121.5 MHz signal to allow aircraft and ships to home in on you when they get close.

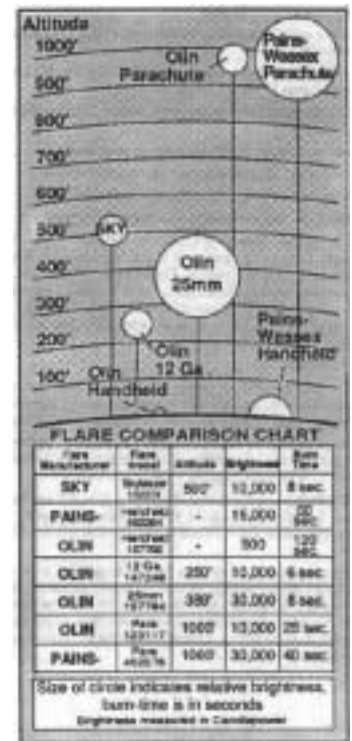
What is the disadvantage of this type of EPIRB? They are currently very expensive when compared to the older style. We sell the ACR RLB-21 for about \$200 (older style) and the 406 MHz ACR RLB-24 for about \$2000. There really is a lot more to making the new style, but this price difference is going to slow their acceptance for some time. If you are leaving for the Southern Hemisphere, you need to strongly consider the newer, more sophisticated EPIRBs.

### On Flares and Signaling Devices

The Coast Guard requires as few as three meteor flares to meet their Visual Distress Requirements. Although having the minimum number of flares on board is better than nothing, offshore sailors need additional means to attract attention in an emergency.

Marine signaling devices are designed to do two things: attract attention so that someone know you're in trouble, and provide a long duration signal so that rescuers may "home-in" on you. Much of their effectiveness depends on when you want to use them: flashlight-type SOS signals are completely ineffective during the day while smoke flares are invisible at night.

As with any safety gear, the amount of money you spend and the type of devices you buy depends largely on how you use your boat. At a minimum, inland boaters should have three meteor and three handheld flares. Blue water boaters must invest in brighter, longer duration signals that can be seen over a longer distance. The SOLAS-approved flares are unquestionably the best, and we strongly recommend them. For coastal boating, we recommend that you have at least one smoke canister, four handheld flares and four parachute flares, and double that number for ocean passages. As a general rule, you should have an equal number of aerial and handheld flares. If you have not seen the effectiveness of SOLAS flares at a demonstration, we encourage you to see them in action – it will convince you of their superiority.



In addition to the US Coast Guard regulations, racing sailboats must carry safety equipment that meets the requirements of the ORC Regulations. Each category of race, from inland Category 4 races to world-circling Category 0 races, requires a complement of SOLAS-grade flares to be aboard. Here is what the ORC Regs require:

Catgry:	HH Red	HH White	Smoke	Red Para
0,1	4	4	2	12
2,3	4	4	2	4
4	4	4	0	0

The white handheld flares, although not recognized by the US Coast Guard, are intended to warn a ship that a collision is imminent. They are not considered distress signals.

### **On the ORC Regulations**

Before a large ocean race like the West Marine Pacific Cup takes place, the entrants have to prepare their boats with safety gear that meets a certain "category" of racing. The Categories range from 0-4, with a Category 0 race being the most extreme, like the Whitbread Around-the-world race. A Category 4 race might be a race on a lake with boats like J-24s. Between these two extremes are Categories 1, 2 and 3. The West Marine Pacific Cup is a Category 1 race.

If you need to prepare your boat for an ocean race, where do you find out what gear you need? The answers are found in a \$3.00 pamphlet from the USYRU in Newport, RI. This booklet is called the Special Regulations Governing Offshore Racing, commonly called the ORC Regs. Within this annually updated booklet, you will find recommendations on liferafts, safety harnesses, flares, stoves, sails, cockpits, etc. Almost all of the safety gear that we sell is covered in the "Regs".

The "Regs" can be used to create a checklist, to ensure that all required gear is on board. Highlight each of the sections that cover gear for the race you are participating in. As each item is brought onboard, check off the highlighted section. If some of your crew has personal gear that is to be counted in the yacht's total, ask them to bring it prior to the safety inspection.

Most safety inspectors will not ask to see all of the gear, but will concentrate on those items deemed most important, like liferafts, harnesses and emergency steering. Often, if you fail one of these obvious requirements, inspectors will get very picky and you will have your work cut out for you to meet every requirement!

What about non-racers? You will find the ORC Regs are a great place to start when outfitting a cruising boat as well. Safety is safety, whether you are racing or cruising, and cruisers will find a wealth of information and recommendations in the ORC Regs. We recommend that you read through the ORC Regs to become familiar with their contents, and use them as a guide when you ask our favorite questions, "I am planning a cruise next year; what sort of gear do I need?"

### **On Radar Reflectors**

Three important reminders on selecting and getting the most out of your radar reflector:

1. "Intersecting plane" radar reflectors get dramatically more effective with increased size. This is proportional to the square of the smallest cross-plane dimension.
2. Intersecting plane reflectors MUST be assembled so that the planes intersect at exactly 90°. The Davis Economy reflector is very effective, but only if it is assembled squarely.
3. Radar range is dependent on the height of the target. Try to mount your reflector where it is high and can be securely fastened (don't let it spin in the wind).
4. As shown in the Davis Echomaster instruction books, intersecting plane (octahedral) radar reflectors must be mounted in the "catch rain" or "doublecatch rain" position for greatest effectiveness. Although hard to explain concisely, this means that you want the hollows, or pockets, of the reflector to face the incoming radar signal, not the edges of the plates.

### **The West Advisor on Medical Kits**

Any of the medical kits that we sell (or anyone else's for that matter) are incomplete. Why? Because you will always need some prescription drugs for pain, infection and other conditions that require a doctor's OK. If you or any of your crew suffer from a condition that requires prescription drugs, you should insure that the individual and the ship's medical kit have that drug (also include instructions on administering the drug and/or a copy of the prescription).

### **The West Advisor on Fire Extinguishers**

First, let's review the US Coast Guard recommendations for fire extinguishers on pleasure boats. The following table shows how many pounds of chemical an extinguisher needs to be approved by the Coast Guard, and by U.L. laboratories:

CG Rating:	UL Rating:	CO <sub>2</sub>	Dry Chemical	Halon
B-1	5B:C	4	2	2.5
B-2	10B:C	15	10	10

Boats up to 26 feet with enclosed spaces must have at least one B-1 extinguisher. Boats from 26 to 40 feet must carry two B-1 or one B-2 extinguishers. Boats from 40 to 65 feet must carry three B-1 extinguishers, or one B-1 and one B-2. Extinguishers with a UL approval and approved for marine use but no Coast Guard approval will pass Coast Guard requirements.

Fire extinguishers are remarkably effective but you should remember a few rules about their use:

1. They are only effective if you can get to them. We recommend one in a cockpit locker, a Halon version across from the galley and another one forward in the boat. Size is not as important as accessibility, in our opinion.
2. For maximum security, mount an automatic Halon unit in the engine compartment. Even if you are in the next county, the automatic unit will be ever vigilant, responding to unexpected combustion with a blast of fire killing Halon.
3. For your crew's education (and your own), take an older dry chemical extinguisher to the beach this summer and try it on the family campfire. You will never get a chance to practice unless you make it happen. Is it effective? How about if the logs in the campfire have diesel on them? We sell Halon fire extinguishers for about \$15.00. Why not try one of these and see if it does the job (we think that they are amazingly effective, but you should see for yourself).
4. Since a fire onboard a boat is either quickly extinguished or goes out of control, you must train your crew how to get on deck in the worst conditions. Have a training session at night, and assume that the fire is blocking the companionway. Can you get the lifejackets? Flashlights? Liferaft? Can you get up the forward hatch? A sixty-minute fire planning session is one of the best investments you can make in boating safety.

### On Proper Nautical Nomenclature



Our customers are remarkably quick to point out errors in our catalogs, and we appreciate their help in making them accurate. We recently received a "Memo From the Captain" which admonished us for referring to the Bosun's Whistle as a whistle; our reader indicated that it is correctly referred to as a "pipe" or a "call".

Various references were cited,

including the 1903 *Manual for Seamanship*, one of our standard reference texts. Imagine our chagrin! As you can see, we have corrected this faux pas, and apologize for any inconvenience it has caused. Thanks, Capt. Berryman!

### On Man Overboard Packages

We have offered man overboard packages for many years, but we have changed our opinion on how they should be used recently. They are still required equipment on racing boats, and contain the same seven components that they have for years: a flotation device, a man overboard pole, a strobe, a dye marker, a drogue, a whistle and a launching device. The reason for our change is that man overboard rescue techniques have been improved recently largely due to the work of the Naval Academy Sailing Squadron and the Sailing Foundation in Seattle, WA.

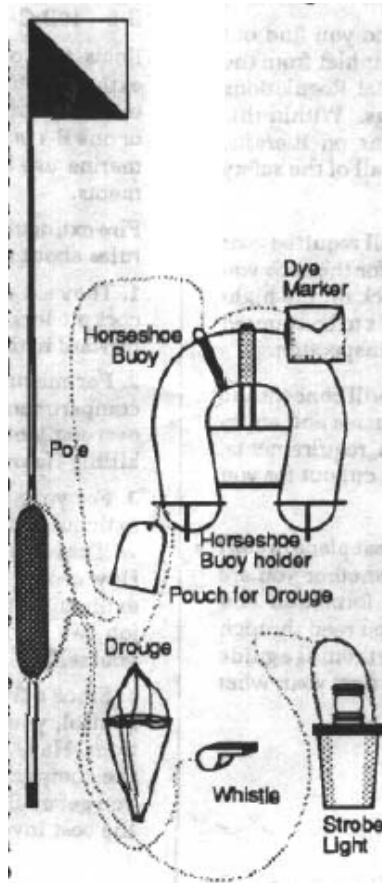
Man overboard packages used to be deployed so that the victim would have a flotation device to support him and signaling devices to attract attention – both worthy goals. The remaining crew on the vessel prepared to return to the victim, but the emphasis was not on the speed of the return, or on minimizing the distance, but rather on using a systematic approach to return to the spot where the victim went over. Depending on the point of sail, and size of the vessel, this could take from 15 seconds to several minutes. The victim was generally out of sight during some portion of the return. Frequently, the victim could not swim to the deployed gear, because it drifted faster than he could swim, or because he could not see it. If when the victim and vessel got back together, the problem still remained of how to get the victim on board.

Some offshore racing and cruising skippers took it upon themselves to develop better techniques and equipment for rescues. In the late 60s, the owner of Rascal, a custom aluminum 60 footer out of Santa Barbara, built a stainless cage that held a man overboard pole, a horseshoe and a two-man liferaft. This fell into the water when a lanyard was pulled, and was actually deployed when a crewmember went over the side. The crewmember, however, was able to grab a line in the water while the man overboard gear floated astern.

In the early 1980s, the Naval Academy Sailing Squadron, at the request of USYRU's Safety Committee, began a systematic study of the Man Overboard problem. Their investigation revealed that the proximate cause of most fatalities was losing sight of the victim. They developed the Quickstop maneuver to prevent this. In other tests, they determined that a superbly conditioned midshipman could not swim more than 50 ft in normal sailing gear. Further, the average time to deploy the required man overboard gear was some 21 seconds from the realization that a man was overboard. Since a

boat at 6 knots travels 600' per minute, it was obvious that a victim would seldom get to the gear deployed for him. The Quickstop Maneuver was designed to minimize the distance sailed away from the victim, and to place the vessel in a position relative to the victim so that he can be pulled aboard.

In Seattle, WA, in a completely separate effort, Sailing Foundation members were working on a similar solution that could be implemented by a single crewmember on the rescuing vessel. Their research led to the Lifesling rescue system, which provided flotation for the victim, as well as a method of hoisting him onboard. After reviewing the Quickstop technique and the Lifesling's function, boating magazine and organizations have been nearly unanimous in their approval of the new methods.



In light of these changes, where does that leave the man overboard package as a safety device? Both the Sailing Foundation and Sailing Squadron agree that deployment of a "package" may complicate or interfere with a Quickstop-style rescue. The use of "packages" seems to have been reduced to those rescues where you can return to the victim, but are not able to hoist him aboard immediately and need to leave him with the means to attract attention at a later date. One expert said that he wouldn't drop a man overboard pole on a swimmer unless he could get close enough to "harpoon" him. The Naval Academy procedure says this in so many words, too. So instinctively releasing a *man overboard package* is probably the wrong thing to do. But getting it ready to drop alongside the victim is a good idea, in case, the lanyard between the horseshoe and the pole should be shortened from the previous 25' to 8' or so, and only floating line should be used – to prevent the extra line from getting caught in the rudder or propeller.

Some final notes on falling overboard: Neither of the organizations was successful in developing a means of providing flotation immediately to a man overboard victim. You need to be wearing something that will support you reliably until your shipmates return to rescue you. There are several comfortable inflatable devices now available which will greatly increase your chances of survival. And if you carry a strobe light attached to you at night, your rescuers will have a fighting chance of finding you when they come looking.

### On Drogues and Sea Anchors

Most of us have heard of using drogues or sea anchors as a storm tactic, but few of us actually know when, how and why they are used. We recently read a report of the subject, written by Victor Shane, called the *Drog Device Data Base*. Mr. Shane has compiled over fifty reports of sea anchor and drogue use by commercial and recreational boats, in conditions ranging from a fresh breeze to a full hurricane. Although Mr. Shane has sold numerous sea anchors through his company Para Anchors International, his book handles the subject fairly and objectively, relying primarily on first-hand reports of boaters who have had to rely on either drogues or sea anchors.

The *Drog Device Data Base* is a 200-page work that is very comprehensive. If we were to summarize the points that we found interesting, they would be as follows:

**What's the difference between drogues and sea anchors:** This has always puzzled us and, judging from how the terms are used in various articles, it has puzzled others as well. We now think of drogues as being smaller, sometimes porous, drag producing devices that generally are used off the stern to slow a vessel and make it easier to steer downwind. Devices that fit in this category are the Galerider by Hathaway Reiser and Raymond, and smaller parachute-type devices up to about 5 feet in diameter. Sea anchors are designed to be used off the bow and have sufficient drag to be considered immovable by the pull of the vessel – they figuratively “anchor” the vessel *to the ocean surface. They are used when the vessel's speed must be reduced to an absolute minimum, as when trying to maintain position off a lee shore.* Sea anchors are large diameter parachute-like devices with diameters from 12 to 28 feet.

**When do you use a drogue?** Drogues are used when the speed of the vessel, even under bare poles, is so high that the vessel is hard to steer and pitch-poling appears likely. They allow moderate amounts of maneuvering, while keeping the stern of the vessel towards the wind and waves. The vessel must be steered during their use; their use implies an active, rather than a passive storm tactic. If used off the bow, like a sea anchor, their insufficient drag will allow sternway that is high enough to risk damage to the rudder or to allow the bow to swing away from the wind.

**How is a sea anchor used?** Sea anchors are used any time that you want to passively remain in the same position on the ocean surface. There are two primary times that boaters want to do this: when they want to stand-off a harbor or passage while waiting for favorable conditions, and when using storm tactics to survive a storm. Sea anchors are always used off the bow, to present the minimum resistance to wind and waves. Their drift varies depending on the size of the sea anchor, size of the vessel and weather conditions, but is usually in the ½ to 2 knot range. Sea anchors must be attached with a long nylon tether which is approximately the same size as the vessel's nylon anchor rode (3/8" to 5/8" and 200 to 600 feet long for most pleasure boats). The use of a long rode allows the sea anchor to ride one or two wavelengths in front of the vessel, thus moving in harmony with the surface water that the vessel is experiencing.

**Doesn't the high resistance of a sea anchor make your boat a sitting duck?** Although a sea anchor makes you almost immobile in the water, the long rode acts as an effective shock absorber to reduce the strain on the boat and the sea anchor. Remember, too, that your bow is facing the waves, so that it tends to cleave the waves rather than project a flat transom and companionway to the oncoming seas. Finally, by letting out enough rode so that the sea anchor is one or two wavelengths away, it will tend to move similarly to the vessel.

**Conclusions:** I think that “drag devices” in general are misunderstood by boaters and that Mr. Shane's research is very educational. It is critical that when boaters that find themselves in storm conditions, that they document their findings on what proves effective and what fails. We think that both low-resistance drogues and high-resistance sea anchors are important, effective devices for dealing with storm conditions, *but their use must be understood and not be confused.* Drogues off the stern will be helpful in slowing a vessel for steering, while sea anchors off the bow, will be helpful in reducing drift to a minimum and holding your bow into storm waves and wind.

#### **On Standard Operating Procedures:**

There are several emergencies onboard a sailboat at sea that require the preparation of Standard Operating Procedure. Used by the military for many years, Standard Operating Procedures, or SOPs, describe what everyone should do during an emergency. This has the effect of concentrating the crew's efforts in solving the problem

and preparing the crew for situations not commonly encountered. This, in turn, reduces the amount of panic experienced by the crew. There was a tragic event last January that, once again, impressed me with the necessity of having Standard Operating Procedures in effect on board vessels at sea. That event was the loss of Stewart Kett, a personal friend and accomplished sailor. His tragic death, while sailing down the California Coast, should affect how all of us view safety at sea and especially Standard Operating Procedures.

Let me quote from *Latitude 38* regarding the conditions surrounding Stew's death as recounted by Pat Price, a close friend of Stew's:

As the day wore on, gusts to 35 knots in conjunction with 6-8 foot following seas pushed Octavia over the water at increasing speeds.... Stew... relaxed in the cockpit while I (Pat Price) continued surfing Octavia into the moonless night; we were recounting sailing adventures and generally enjoying our long friendship. A good sized wave started us off on another roaring surf ride when a gust hit, suddenly rounding us up and burying the rail in a sea of foam. As I got Octavia back on her feet, I asked, “Are you all right, Stew?” No answer. “Stew, where the hell are you?” I yelled. He answered close by, “Pat, I'm back here.”

He was in the surf behind the boat, and as I yelled “Overboard! Overboard! Pandemonium broke loose. The crew, below at dinner, thundered onto the deck, tossed the strobe, pole and horseshoe; and the navigator hit the save button on the Trimble Loran. Sails were dumped and we circled the strobe. The Coast Guard was called and they promised a helicopter and a cutter.

Nobody saw a light, nobody heard a cry or whistle. We circled the Loran coordinates... He simply disappeared.

#### **Man Overboard:**

Man overboard rescue techniques have changed dramatically in the last decade. There are few emergencies onboard a sail or powerboat that require the same degree of prompt, instinctive action. The SOP that may have saved Stew's life is called the QuickStop Maneuver. The QuickStop Maneuver can be utilized whether the vessel is traveling upwind or downwind. The steps involved in an upwind QuickStop Maneuver are as follows:

Shout “Man Overboard;” tack the boat immediately, allowing the jib to backwind against the mast.  
Throw flotation to the victim.  
Continue to bear off until headed downwind. Drop the headsail on the foredeck.  
Jibe the main and come alongside the victim while headed into the wind.  
Make contact with a heaving line and pull the victim to the leeward side of the vessel.  
Three or four crewmembers lift the man onboard.

If the vessel is running with a spinnaker, the process is only slightly different:

Shout “Man Overboard;” toss flotation to the victim and round the boat into the wind.

Ease the spinnaker guy so that the spinnaker pole touches the forestay.

As the boat nears head-to-wind, let the spinnaker halyard run free and gather the sail. It should fall on the deck and be remarkably easy to gather.

Sheet in the mainsail and sail close-hauled to the victim. Come alongside of the victim and stop the vessel abeam of him.

Make contact with a heaving line and pull the victim to the leeward side of the vessel.

Three or four crewmembers should lift the man onboard.

This technique reduces the distance sailed away from the victim because there is **a high correlation between the distance between the vessel and victim, and the likelihood of recovering the victim.**

In the case of Stew's accident, a Lifesling would not have made any difference, because he was too far away and too hard to find to utilize it. But a Lifesling is very effective, especially when sailing short-handed because the vessel does not have to be precisely maneuvered. The Lifesling's use has become the accepted method of recovering a man overboard, because it solves three of the problems faced with a man overboard:

1. It delivers flotation to the victim.
2. It allows you to make contact with the victim.
3. It provides a means of hoisting the victim onboard.

Man Overboard rescue techniques must become **instinctive** to every member of your crew *because it is so time-critical*. It is commonly the skipper of the boat who finds himself in the drink. Ask yourself if the remaining crew with whom you sail would be capable of rescuing you.

#### **Abandoning your Vessel:**

This is the second SOP. Abandon Ship, although an infrequently encountered drill, is sufficiently terrifying to justify a set of procedures that are practiced by the crew.

Establish the following:

1. Who is in charge of damage control?
2. Who is responsible for securing the liferaft's lanyard and launching the raft?
3. Who is responsible for the Abandon Ship Bag?
4. Who is the radio operator?
5. What else should we bring with us if we have time?

Buy or rent a good liferaft, have it serviced, and avoid using it by preparing your vessel for the unexpected. Liferafts are a poor substitute for your boat, as the Fastnet victims and survivors found out. As long as your boat has freeboard, stay on it and only board your raft as a last resort. But, if you have to, be prepared by knowing what to expect once you get on board. A liferaft is designed to sustain a few people for three or four days prior to rescue. They do not have EPIRBs as standard equipment, and do not have sufficient water (or a solar still) to allow you to last one week. Rafts need to have these items packed inside of them, or in an immediately accessible Abandon Ship bag, so that you will survive. Discuss abandoning ship with your crew and establish an SOP for this possibility. You do it for jibes – why not emergencies?

#### **Damage Control:**

There will be occasions at sea when something occurs that requires immediate, coordinated effort, on the part of the crew: a dismasting, running aground, loss of engine power, a broken rudder, flooding, a

structural failure, etc. Because of the variety and infrequent nature, it is difficult to prepare for any emergency that might arise. You can, however, prepare your crew to respond quickly to potentially damaging situations by assigning tasks in advance. As with the Abandon Ship Standard Operating Procedure, a person should be assigned to operate the radio, several should be on deck to deal with the operation of the vessel, and several should be responsible for initiating repairs.

**Dismasting** – Quick response to a dismasting may prevent the mast from piercing the hull. Immediately stop the boat and try to protect the hull from the ragged ends of the spar. Initiate removal of the rig.

**Going Aground** – Try to keep the vessel from going harder aground by setting an anchor to windward, and keeping tension on the line.

**Structural Damage** – Remove strain from the source of damage by reducing sail, luffing the sails, slowing down, setting a drogue or sea anchor. If a shroud parts, consider tacking immediately to place the shroud on the leeward side.

**Loss of engine** – This is really a problem with insufficient sea-room, especially in a channel or in high current conditions. You should have an anchor ready at all times, to stop your motion, plus have sail covers off if there is enough wind to sail.

**Flooding** – Due to the possibility of capsize, you must be prepared to remove lots of water from the boat's interior. This requires the two mandatory pumps, as well as two or more large buckets with lanyards attached to the handles. Until the boat is emptied of the water, it will be hard to steer, and be much more likely to take on additional water.

**Capsize** – Because of the heavy seas that can occur along our coasts and offshore, you need to be prepared for the possibility of knock-downs and capsizes. This is exacerbated by the use of spinnakers at night when its not uncommon to round-up or round-down, and by sailing light and ultra-light racing boats that commonly carry lots of sail. This requires that boat owners insure that the gear on the interior of the vessel is secured so that it cannot break free and injure crewmembers. This is also true with gear above deck like man-overboard gear, winch handles, liferafts, cushions, ground tackle, etc.

**Fire at Sea** – although I consider a fire at sea a relatively low risk, it makes sense to create a SOP for fire on board. Fires at sea tend to be extinguished in the first minute or not at all. Practice fire fighting, getting on deck, shutting off fuel sources, etc. Use Halon extinguishers for effective, clean fire fighting. Consider the purchase of an automatic Halon extinguisher for the engine compartment – it will be ready to fight fires that you may not even be aware of.

#### **In conclusion:**

Safety at Sea requires more than just having the correct gear for the situation. It also involves the practice of particular maneuvers that, when properly executed, can turn an emergency at sea into a drill which is accomplished without panic. It is the skipper's responsibility to make sure that all of the crew are familiar with a modest number of safety techniques. It is also the skipper's responsibility to set a good example by wearing a lifejacket and/or safety harness before the conditions warrant it. The simple act of wearing harnesses and lifejackets while at sea could prevent many needless deaths.

**On Equipment Requirements:**

The need for various components of your safety inventory depends on where you operate your boat, how far away a rescue service is, and your desired degree of self-sufficiency. The following is a brief description of various categories of safety gear, and how your requirements might differ depending on whether you are sailing to Santa Cruz Island or Cabo San Lucas.

<u>Equipment</u>	<u>Coastal</u>	<u>Offshore</u>
Lifejackets	Buy the best	Buy the best
Lifesling	Absolutely	Absolutely
Liferafts	Inflatable dinghy	Coastal or Offshore raft
Safety Harnesses	One per crew	One per crew – comfortable
Dewatering pumps	ORC requirements	Plus engine-driven
Flares	USCG Approved	SOLAS Approved
EPIRB	No, use VHF	Yes, Class B, Category II
Medical Kit	First Aid	Trauma, drugs
Sea Anchor	No	Yes
Radar Reflectors	Yes, temporary	Yes, permanent
Fire extinguishers	Yes	Yes
Communications	VHF, cellular phone	SSB, Ham
Watermaker	2 gallon jugs	Survivor 06, 35
Navigation	DR, Loran, Depth	Add GPS
Ground Tackle	1 storm anchor/rode	2 storm anchors/rode
Weather information	VHF radio	High Seas, WFAX
Standard Operating Proc.	Yes, simplified	Yes, comprehensive