BOATING BASICS

Contents....

Know Your Boat!

Hull Types One thing every boat has in common is a hull. A "hull", or bottom of a boat, comes in several different forms. Each form has a unique shape that gives it certain handling and performance characteristics. Your boat has the hull form that it has to best match the type of boating it was designed for. In general, hull forms fall into one of the two following categories:

Planning Hulls:
Planing hulls are designed to ride on top of the water, regardless of the weight of the boat. The flatter the bottom, the easier it is to get on plane. Also, less power is needed to attain high speeds with a flatter hull. The trade off is in handling. Flat hulls do not do well in rough water. Many planing boats use a shallow "V" shape to ride better in rough waters.

Displacement Hulls:
Displacement hulls typically have a rounded bottom with a tear drop shape running bow to stern. Displacement hulls "displace" or move, an amount of water equal to the weight of the boat. Displacement hulls are very efficient—most long range cruising boats such as trawlers and many sailboats use this type of hull. But because of their design, displacement hulls are restricted in their speed to the square root of their water line length times 1.34. Therefore, a 64 foot boat can realistically only expect a top end speed of a little over 10 knots. The following hull types are variations of planning and displacement hulls.

Flat Bottom:
Flat bottom boats are typically small open boats such as john-boats. Flat bottomed boats can easily get "on plane" or ride on top of the water at high speeds. Flat bottom boats are typically intended for use on calm waters such as ponds, small lakes, and slow rivers because they do not handle well in choppy or rough water, especially at planning speeds. Flat bottomed boats are not very stable; caution should be used when moving around them.

Round Bottom:
Round bottom boats almost "glide" through the water. Because round bottomed boats are very efficient at moving through water, most cruising sail and power boats have rounded hulls. Typically, round hulled boats move at slow speeds.

Deep-V hull:
"V-hulls" are designed to operate at high speeds and to "cut" through rough water. V-hulls are not as efficient as flat or round bottomed boats, and need larger engines to move at similar speeds.

Cathedral hull:
Cathedral or multi-hulls, are two or more hulls attached together. This combination of hulls allows for much more stability than what is found in other hull forms. The air pocket that is formed between the hulls may also provide lift, helping the boat get on plane more easily and increasing efficiency. Basic boat terms Certain basic boating terms apply specifically to boats equipped with one or more engines-whether in board (mounted with in the hull), outboard (mounted on the transom and detachable),or the combination in board-outboard (1/0) type. Thrust for the movement of the boat through the water is achieved by a rotation of a propeller (or "screw"), which draws in water from a head and pushes it out astern. A boat with one propeller is termed a single-screw type. Boats with two propellers are referred to as twin-screw craft. Sailboats fitted with an engine are called auxiliaries. The handling characteristics are similar to those of the single-screw power boat. Steering is accomplished in one of two ways. An inboard engine operates according to a "fixed screw": Turning a rudder or rudders diverts the thrust developed by the propeller(s), which in turn turns the boat. An outboard or I/O powered boat operates without a rudder. Moving the motor and propeller, or out drive unit, directly turns the propeller thrust, changing the boat's direction. The ability to steer well-called helmsmanship, when referring to either men or women-is a quality that cannot be learned from a book or in a classroom. However, understanding the basic principles of boat handling will make it easier for you to practice in a variety of situations.

The art of helmsmanship:

It is important to realize that boats are nearly as individualistic as people, particularly in their steering characteristic. Deep-draft and shallow-draft vessels handle differently. Boats that steer by changing the thrust direction-outboards and stern drive-respond differently than boats steered by rudders: the response of heavy displacement hulls to helm changes to quite unlike that of light planning hulls. The secret of good helmsmanship is to know your boat. If you skipper your own craft, this comes quickly as you gain experience with it. If you take the wheel or tiller of a friend's boat, however, take it easy at first with helm changes, until you get the "feel" of the craft's response.

Fueling

Proper fueling procedures are very important in preventing onboard fires. Gasoline vapors are heavier than air and can spread rapidly into enclosed spaces. You should check the bilges and all closed compartments for gasoline vapors. The sniff test is the most effective method for detecting fuel leaks. The proper way to fuel your boat is as follows:

- Secure boat to the dock. Switch off engine(s).
- Extinguish all open flames.
- Do not use electrical switches.
- No smoking.
- Ports, hatches, and doors closed.
- Make certain all passengers are ashore. Determine quantity of fuel required and make sure it is the proper type of fuel.
- Hold hose nozzle firmly against fill pipe opening.
- Do not overfill.
- Wipe up all spillage.
- Open ports, hatches, and doors to ventilate.
- Turn blower on for four minutes minimum.
- Do the sniff test.
- Start engines(s).
- Re-board Passengers.
- Untie from dock and cast off.
- Proper fueling techniques also keep our water clean and safe, and help marine life thrive in a healthier environment.

For portable tanks do the following:

- Tanks six gallons and smaller should be removed from the boat.
- Add appropriate amount of oil for 2-cycle outboards to fuel tank.
- Make sure hose nozzle is in contact with rim of tank.
- After filling, secure tank to the boat so it will not slide around while underway.

Fuel Conservation Tips:

- Keep engine well tuned.
- Use the correct propeller and check for damage.
- Be sure engine is adequate for boat.
- Use proper oil mix in motor.
- Keep hull clean to reduce friction.
- Drain all water before leaving dock.
- Distribute weight evenly and don't overload.
- Shut off engine when at dock or at rest.
- Make fewer turns so as to not increase motor load.
- Plane smoothly and quickly at take off then throttle back to cruising speed.

Other Fumes:
For many boaters, an enjoyable time on the water includes having all of the creature comforts that they are used to having at home such as hot water, heating and cooling, and a stove or grill. While having these items may make for a more enjoyable cruise, they must be handled much more carefully on a boat, and may operate very differently from their shore side counterparts. Hot water heaters, stoves, grills, air conditioners and heating systems all need fuel to operate.
Types of fuel include:

- Electricity,
- Alcohol
- Compressed Natural Gas (CNG)
- Liquid Petroleum Gas (LPG-propane or butane)
- Charcoal
- Kerosene, and diesel.

Each fuel has specific characteristics, both pro and con, that you need to know before you use it for a particular piece of equipment.

CNG Compressed Natural Gas is natural gas liquefied under high pressure. (approx.2250psi) CNG fumes can combine with oxygen to form a powerful explosive. Though CNG fumes are lighter than air and will generally dissipate through open ports and hatches, care must be used with CNG appliances. Manufacturers include additives in CNG to make it smell strongly.
Nothing beats an nose to sniff out gas fumes!

LPG-Liquefied petroleum gas is really two different gases that are generally classed together and are interchangeable. Propane and butane are both used in LPG appliances and have some advantages over CNG. LPG has a much higher heat output (21,000 BTUs / lb. For LPG vs. 9,000 BTUs / lb. for CNG) LPG also operates at lower pressures. One thing to note, if you boat in cold weather, propane is preferable to butane, as butane has difficulty vaporizing in extremely cold weather and might not allow an appliance to work properly. One drawback to LPG is that fumes are heavier than air, and can build up to dangerous levels in bilge compartments. Even a small spark can signal the end of your boat!

Kerosene is also used on boats for heating, lighting, and to a lesser extent, cooking. Kerosene must be totally clean for it to work properly, and the whiter the kerosene the better. If you have yellow kerosene DO NOT use it in your burners, as it may clog your burner with carbon deposits.

Alcohol is used largely for stoves and is a relatively safe fuel. Denatured ethylalcohol does not burn very hot-it may take quite some time to boil water on an alcohol stove. One of the best aspects of alcohol is that a flame can be put out with water. Like kerosene, alcohol must be clean for an appliance to work properly.

Electricity is probably the safest "fuel" that you can use on a boat. There are no explosive fumes, no pressurized fuel system that can develop dangerous leaks. Electricity's main drawback is the large amount of current most appliances need to operate properly. Large current demands that many appliances need require boats to be hooked up to shore power or to have a generator.

All fuels must be properly stored on a boat. Safety devices such as fume sniffers should be considered for boats equipped with any gas system.
Remember, gasoline should NEVER be used to fuel any onboard appliance other than a generator or main engine. Gasoline is extremely volatile and its fumes are deadly.

Marlinespike

Marlinespike seamanship is the art and practice of handling and working all kinds of rope. When "rope" is brought and used aboard a boat, it becomes known as "line". Several types of line are used aboard both power and sailboats, including those made of natural fibers, synthetic materials and wire. As a boater, you will have occasion to handle line every time you leave the dock. So, it is important that you understand the best uses for each type of line. And make sure to take good care of your line, by inspecting it regularly for deterioration and chafing.
Here is some information about the use and care of different types of line.

Natural Fibers
The most versatile of natural fiber line is manila, which is noted for its strength and flexibility. It is used for mooring and anchor lines, and for running rigging such as sheets to control sails. Manila line shrinks when wet, and will rot if stowed wet. If used in salt water, manila line should be thoroughly washed with fresh water, and should always be dried before stowing. Keep lines away from heat sources, acids and oils.

Synthetic Materials
Line made of nylon is excellent for use as anchor rode, and docking and towing lines. It is the strongest line for its size, and can stretch up to 40% of its length. It can be stored wet, but should be regularly washed with fresh water and mild detergent.

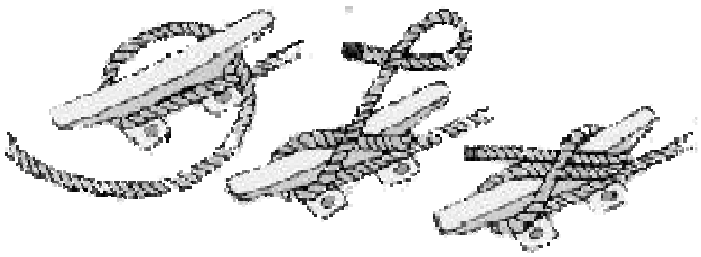
Polyester line:
Polyester line, although 10% weaker than nylon and not as flexible, has some excellent uses. These include running rigging, sheets and halyards. Make sure to use chafing gear with polyester line, as it tends to chafe easily. Polypropylene line is the least costly of synthetic lines. It has a hard texture that slips on cleats and can cut skin. Because it floats, it is the best line to use for towing a water skier. Polypropylene deteriorates when exposed to sunlight.

Wire:
Steel wire is used for standing and permanent rigging and halyards for hoisting sails. It is very strong, but has little stretch. Inspect wire for corrosion and kinks and keep it well lubricated.

Stowing and Coiling Lines
There are several ways to properly stow your line once it has been cleaned. The simplest way is to coil the line in a clockwise direction. You can then either leave it laying on deck, or hang it by tying it up with extra line or nylon straps. Or you can "flake" line by simply laying it in the form of a figure eight. When stowing line, consider how soon you'll need it again, in order to leave it accessible, and make sure it is not left where it will interfere with the boat's operation.

Whipping
Whipping is a practice done to the ends of three-strand line to prevent it from unraveling. Although there are several types of whipping, it is most commonly done by cutting the line with a hot knife and wrapping some adhesive tape at each end. When buying line, you can buy pre-packaged lengths that are already whipped. Or, ask store personnel to whip line for you.

Knots to Know:
Practicing knots and hitches can be fun for your whole family! It can help you develop an appreciation for the history and sport of boating. The knots below are most commonly needed in boating.



Cleat Hitch:
Needed by every boater, this is the best way to belay, or attach, a line to a standard cleat.

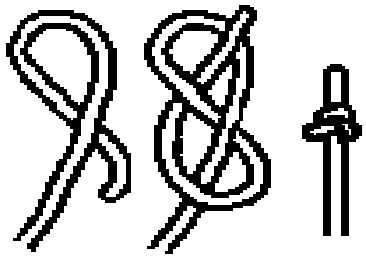
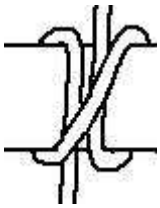
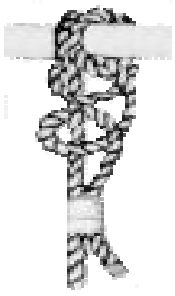


Figure Eight Knot:
Forms a solid lump in a line, which is effective for preventing the line from running out too far through a block or fairlead

Square Knot (also known as Reef Knot):
The most common way to bind together two ends of rope to enclose an object. It can also be used to tie together two lines of equal size, but is known to slip if used on ropes of unequal diameter.

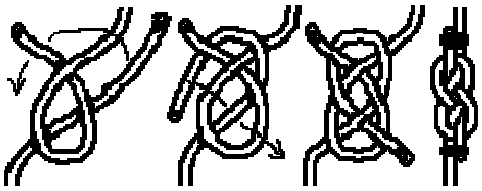


Clove Hitch:
Used to tie a line to a piling or a fender to a railing, it is easy to adjust the length of the line.

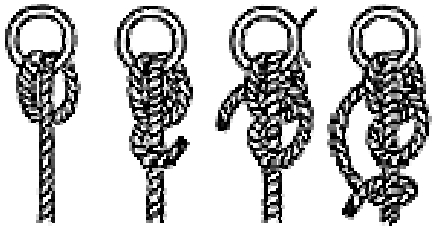


Round Turn and 2 Half Hitches:
This hitch is commonly used to secure a line to a spar, eye or ring, for example, to secure fenders.

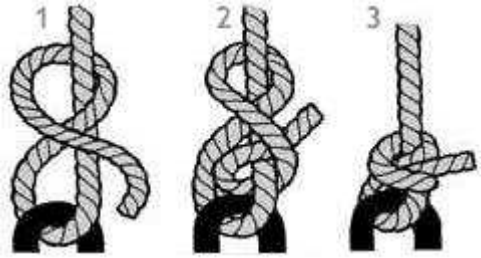
Sheet Bend (also known as Becket Bend):
Used to join two lines of two different sizes together, this knot is easy to untie after being under load.



Carrick Bend:
Used to join two lines of the same size together, generally for heavy, stiff lines of the same size.



Anchor Bend (also known as Fisherman's Bend):
Typical way to fasten an anchor line to the ring of anchor. The double loop reduces the possibility for chafing and makes the half-hitches more secure.



Buntline Hitch:
Excellent for fastening a halyard to a shackle. Easy to tie and untie.

Splicing
Splicing is an age-old practice used by sailors to form a loop at the end of a line or to join two lines together. It is an art that takes some practice to perfect, and there are several different ways to splice. Fortunately, you can purchase line with loops already sliced in.

Engine Basics

Your Marine engine- whether it is gas or diesel, has some basic differences to its cousin that powers your car. Not knowing the difference between marine and automotive parts can cost you a great deal of money or even your boat. Inboard engines use components such as alternators, starters, wiring, carburetors, transmissions and fuel systems. Starters, alternators, distributors, starter solenoids, and all the electrical motors should be ignition protected if they are intended for marine use. This means they are sealed to contain sparks, which are produced in normal use. Sparks under the hood of your car are not a hazard, since a constant draft prevents an accumulation of flammable vapors. In the confined spaces of your boat's bilge, however, one spark plus one small gasoline leak can mean disaster. Propane, CNG, charging batteries, and even methane (holding tanks) pose a potential for flammable gas leaks. Some automotive carburetors and fuel pumps are designed to leak. They have vents, which emit small amounts of gasoline if a carburetor float chamber overflows or a fuel pump develops an internal leak. The gas drips harmlessly out of the car. On marine carburetors, these vents lead into the carburetor throat so that the engine consumes any overflow. Marine fuel pumps are sealed to eliminate external leaks. On most inboard gasoline engines the Coast Guard requires a backfire flame control or "flame". This is a circular metal grid that sits on top of the carburetor. Its only function is to prevent flames from escaping into the engine compartment.

Wiring and hoses are designed to withstand water and the high heat and petroleum solvents such as fuel that are present in an engine compartment. Transmissions are much heavier than their automotive counterparts because of the constant strain of moving the boat. There is no coasting for a marine engine! If you find yourself shopping for replacement parts for your boat's engine, you may find an annoying price difference between "Marine" parts and common automotive parts. The difference is due to small but important modifications, which are not intended to keep you poor but to keep you healthy.

Always chose marine grade parts for your boat. They will last longer, help keep the value of your boat, and they may save your boat from unnecessary

Alcohol & Decisions on the Water

SOME SOBERING FACTS

Eight hundred or more people die in boating accidents every year. More than 80% of them drown. Drowning is the third leading cause of accidental death in the U.S. About half of all boating fatalities involve alcohol. The U.S. Coast Guard estimates the number of non-fatal boating accidents to be 60,000 or higher with property damage well over $240 million annually. Each year- from 1961, when statistics were first kept, through 1992- boating accidents have claimed over 800 lives, more than in airplane or train accidents, and have injured thousands more. Waterways are second only to highways as the scene of accidental deaths in the country. The Coast Guard and the U.S. Congress recognize alcohol as a significant problem on the water.

Boating Stressors

STRESSORS COMMONLY AFFECTING HELMSMEN AND PASSENGERS MAKE DRINKING WHILE BOATING EVEN MORE DANGEROUS THAN DRINKING AND DRIVING

Research shows that four hours of exposure to noise, vibration, sun, glare, wind and other motion on water produces a kind of fatigue, or "boater's hypnosis" which slows reaction time almost as much as if you were legally drunk. Adding alcohol to boating stress factors intensifies their effects- each drink multiplies your accident risk.

BOATING is more fun than driving, right? No speed limits, no traffic signals, no merging lanes, no potholes. If you think that makes operating a boat under the influence of alcohol safer than drinking and driving, you could be dead wrong. Alcohol affects your ability to function in three critical ways. Your balance, judgment and reaction time are affected almost immediately with the first few drinks.

A FEW BEERS UNDER YOUR BELT CAN PUT YOU UNDER

Alcohol's effect on your BALANCE can be critical on a boat; simply falling overboard and drowning accounts for at least one in four boating fatalities. When you are "tipsy", the unstable, moving platform of the boat can easily cause you to fall overboard. Harry is just finishing his second beer. His Blood Alcohol Content is only one-third of what would make him legally drunk. But Harry has "Boater's Hypnosis" and by drinking only two beers during the last hour, he increased his chances of having an accident. Will Harry risk and accident or the possibility of a $1,000 federal fine by having another drink? Or will he play it smart and either stop drinking or turn the helm over to a sober skipper? The alcohol that makes you lose your balance also reduces your body's ability to protect you against the cold water. With alcohol in your blood, the numbing effects of cold water occur much faster than when you are sober. Within minutes, you may not be able to call for help, swim to a float or reach the safety of the boat. Additionally, imbibing alcohol can lessen motor function, skew judgment and interfere with decision-making ability. In the event of a fall overboard, it can increase the danger of cardiac arrest and some researchers believe drinking increases susceptibility to inner ear disorientation that is said to cause some swimmers to swim down, instead of up, thus increasing the risk of death or serious injury.

ALCOHOL CAN MAKE A BAD SITUATION WORSE

What else do you lose when you drink? You’re JUDGMENT. In skills tests, alcohol-impaired boat operators all reported that they were better operators while intoxicated than sober, despite instrument readings that documented their reduced performance. Alcohol reduced inhibitions, causing normally cautious people to try stunts or enter high-risk situations a sober person would avoid.

ALCOHOL ONLY MAKES YOU THINK YOU ARE PERFORMING BETTER ... AND DRAMATICALLY REDUCES YOUR REACTION TIME

Alcohol severely diminishes your ability to react to several different signals at once. With the first drink, brain functions are depressed. It takes longer to receive information from your eyes, ears and other senses, and still more time to react. When peripheral vision, focus and depth perception are impaired by alcohol, it is difficult to correctly judge speed and distance, or track moving objects.

Reduced night vision and the inability to distinguish red from green make the intoxicated night boater an even greater hazard.

FACT OR FICTION:

MYTH: Beer is less intoxicating than wine or distilled liquor.

FACT: One 12-oz. beer contains the same amount of alcohol as 5 ounces of 12% wine or 1-1/2 oz. of 80 proof liquor.

MYTH: Diluting hard liquor slows the absorption rates.

FACT: Diluting an alcoholic beverage with water or fruit juice slows absorption. Mixing alcohol with a carbonated beverage increases absorption and intoxicates you more quickly.

MYTH: A cold shower, coffee, physical activity or fresh air will sober you up

FACT: Cold showers and coffee will only produce a clean, wide-awake drunk. Only your liver can detoxify alcohol. For each drink you consume, it takes approximately two hours to sober up.

MYTH: A shot of brandy or whiskey will warm you up.

FACT: In moderate amounts, alcohol dilates the small blood vessels close to the skin, giving a deceptive "glow" of warmth. In fact, the dilated blood vessels reduce your body's ability to guard against heat loss.

MYTH: Alcohol is a stimulant.

FACT: Alcohol is a depressant. It is absorbed directly into the blood stream through the stomach. As blood circulates through your brain, the alcohol depresses body functions and learned restrictions on social behavior. Judgment, balance, vision and reaction time are affected almost immediately.

HOW DO YOU STAY ALERT AND AVOID HAZARDS ON THE WATER?

Limit your alcohol consumption to one drink or less per hour. Always eat before you drink, and sip your drinks. Be aware of the effects of alcohol, both on and in the water. Remember that boating stress factors alone will reduce your ability to function. If you expect to have more than one or two drinks per two-hour period, allow a non-drinker to operate the boat. Better yet, don't go boating. A responsible boater will refuse to allow an intoxicated or impaired person to take the helm. Operation of a boat while intoxicated is a federal offense, subject to a $1,000 fine. Criminal penalties are as high as $5,000. Many states are toughening their "Boats and Booze" laws by stiffening penalties and boosting law enforcement efforts. Most states also restrict operating "under the influence". Operating under the influence has a lower threshold Blood Alcohol Content usually .05%.

However, you may be charged with operating under the influence at any point--it is at the discretion of the boating officer based on their perception of how you are functioning as a boat operator. Banning alcohol from boats is not practical. But moderation and common sense on the water are very practical. When you operate a boat, you accept responsibility for the boat, for the safety of your passengers and crew and for others out enjoying the water. Alcohol isn't the sport. Boating is the sport. Enjoy it safely,