NJROTC
AREA 11

SAIL ACADEMY

June 2018

PRE-ATTENDANCE
STUDY GUIDE

NAME: _____

SCHOOL: _____

SESSION:____ CREW #:____

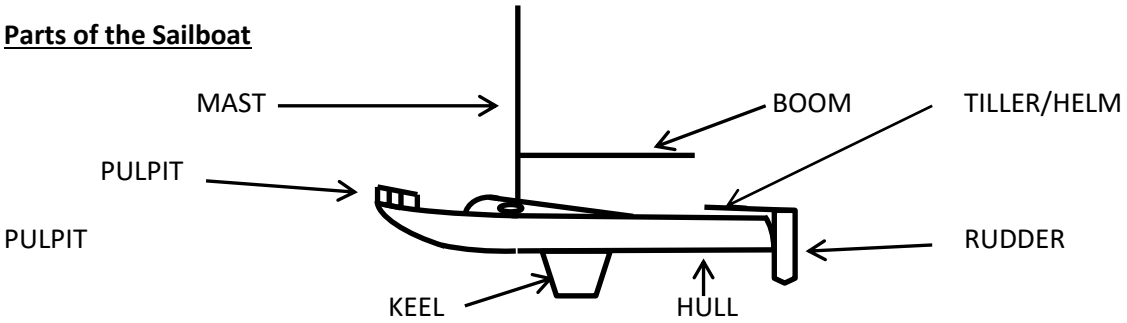
Revised 03/7/2017

Introduction

Man has been sailing the waters of the world for nearly 8000 years. By learning the concepts in this guide you will gain the knowledge necessary to begin your journey joining those mariners of the ages who have been underway on the power of the wind.

Much like learning to drive where knowing about the steering wheel, brake and accelerator really helps, prior to getting underway from the pier you'll need to know some basic things about the sailboat. Once you know the parts of the sailboat it will easier to learn how it works. Finally, you will learn how a crew can safely and efficiently operate and navigate a sailboat. Let's get started.

Parts of the Sailboat



BOOM. A spar used for extending the foot (lower edge) of a fore-and-aft sail.

HULL. The skin of the boat.

HELM. A bar or handle for turning a boat's rudder or an outboard motor.

KEEL. The structural member running fore-and-aft along the vessels centerline and forming the vessel's backbone.

MAST. A spar set upright to support booms, rigging and sails.

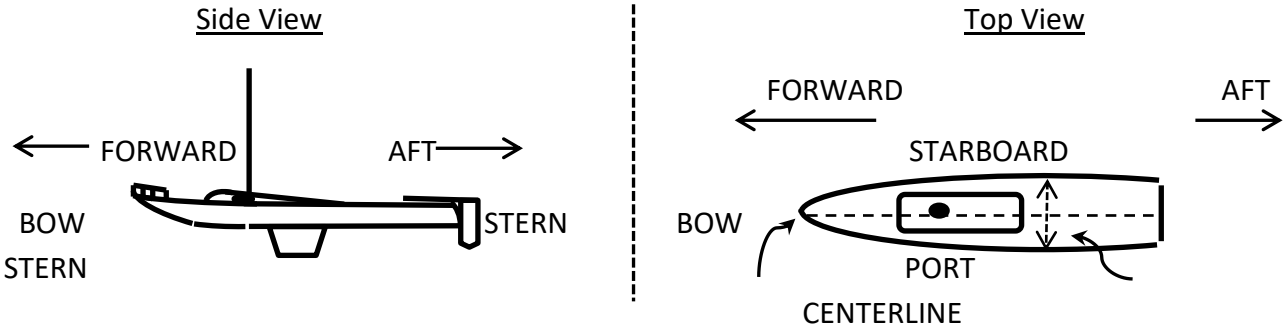
PULPIT. A lookout position featuring a secure railing at the bow of the boat.

RUDDER. A vertical plate or board for steering a boat.

TILLER. A bar or handle for turning a boat's rudder or an outboard motor.

Locations on and off of a Sailboat

Sailors have their own unique terms to identify locations on a boat. These nautical terms make it easier for the crew to communicate quickly. People do the same thing with cars when they say things like passenger side and backseat. Here are some terms used for locations on and off of a sailboat.



ATHWARTSHIPS

AFT. At, near, or toward the stern.

ATHWARTSHIPS. At right angles to the centerline of the boat.

BOW. The forward part of a vessel.

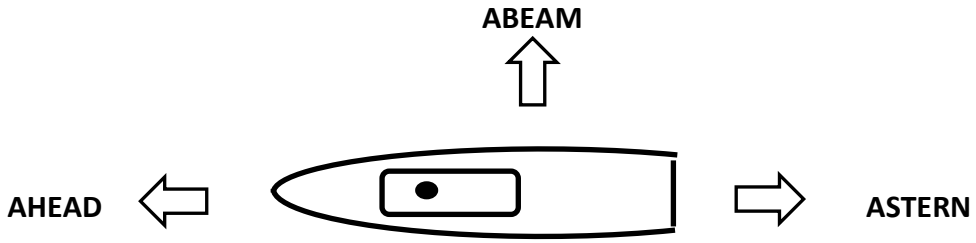
CENTERLINE. An imaginary line down the center of the a vessel lengthwise.

FORWARD. Toward the bow.

PORT. The left side of a boat when looking forward. A harbor.

STARBOARD. The right side of a boat when looking forward.

STERN. The after part of a vessel.



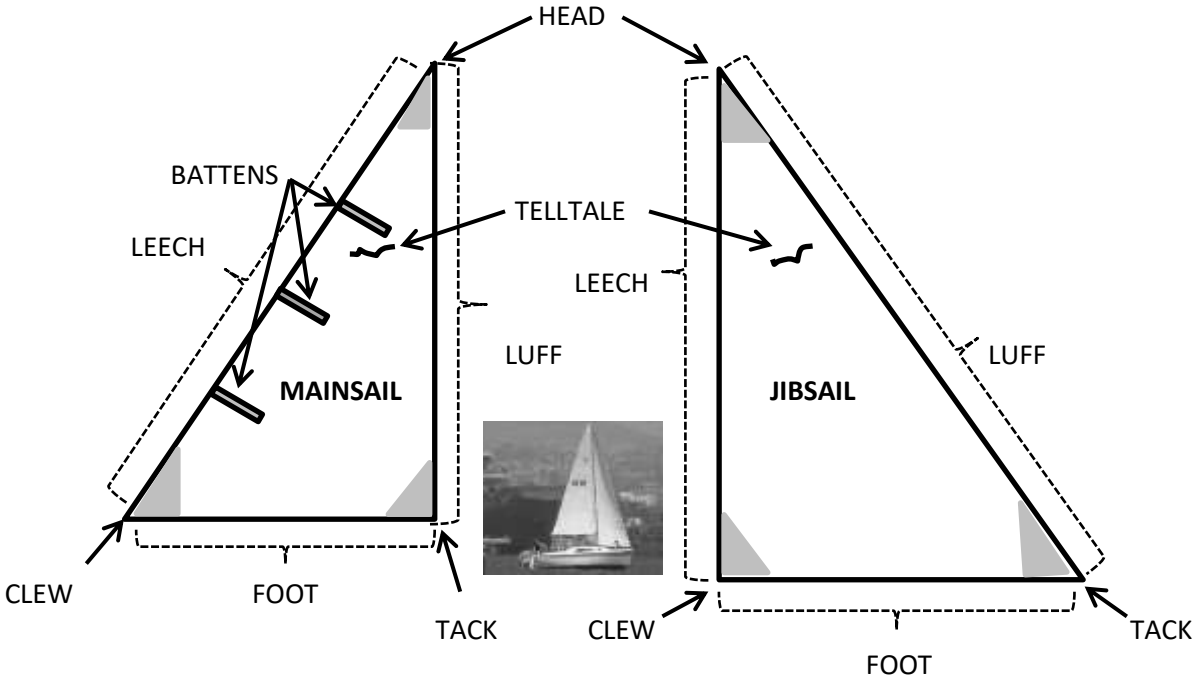
ABEAM. A direction at right angles to the keel of a boat.

AHEAD. Ahead or forward of the bow.

ASTERN. The bearing of an object 180 degrees from ahead.

Parts of a Sail

As you can imagine there are a great many kinds of sailboats and sails. This guide will discuss a sloop-rigged sailboat. This type of rig is used at the academy and is pictured below.



BATTEN. Thin semi-rigid strip fitted into pockets for stiffening the leech of a sail.

CLEW. The after lower corner of a fore-and-aft sail.

FOOT. The lower edge of a sail.

HEAD. The upper corner of a triangular sail.

JIBSAIL. A triangular sail set forward of the mainmast

LEECH. The after edge of a fore-and-aft sail.

MAINSAIL. The principal sail that sets on the mainmast and spread by the main boom.

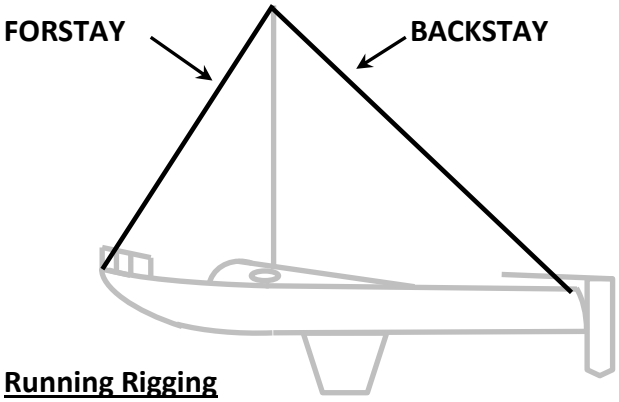
LUFF. The forward edge of a sail.

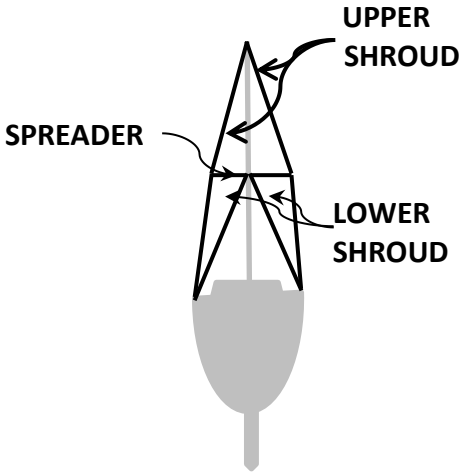
TACK. The lower forward corner of a fore-and-aft sail.

TELLTALE. Lightweight string or material used to indicate wind direction, point of sail and proper sail trimming.

Standing Rigging

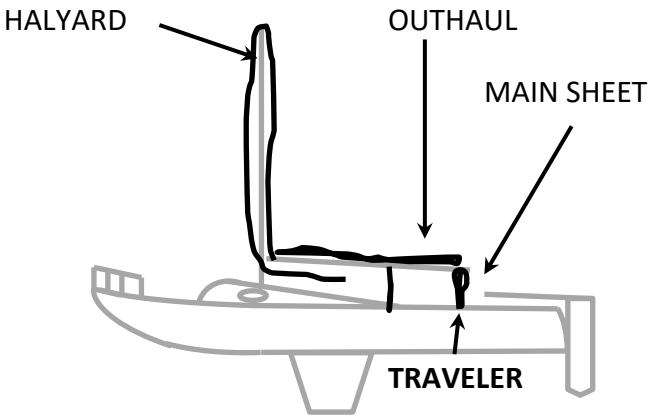
The mast is supported by fixed (non-movable) stainless steel cables which are typically flexible. This rigging holds the mast in place and helps the mast withstand the stresses placed on it by the sail.

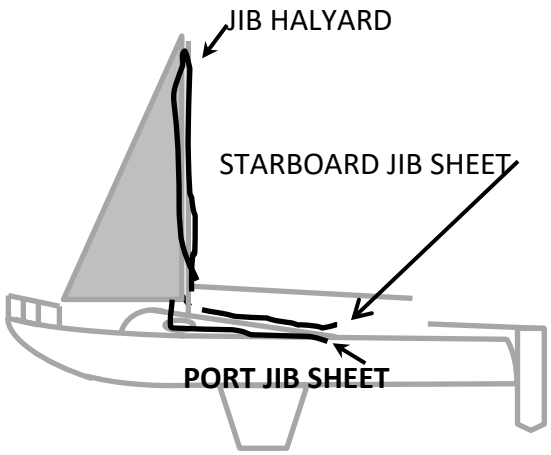




Running Rigging

Running rigging is adjustable (not fixed) and is used to position (trim) sails. The rigging is made of high strength synthetic rope (yacht braid).





HALYARD. A line or wire used to hoist sails or flags.

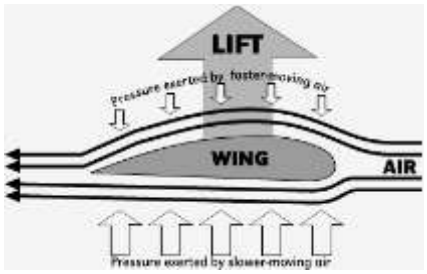
MAINSHEET. The sheet controlling the athwart ships (side-to-side) movement of the mainsail.

TRAVELLER. A device that allows sheets to slide athwart ships.

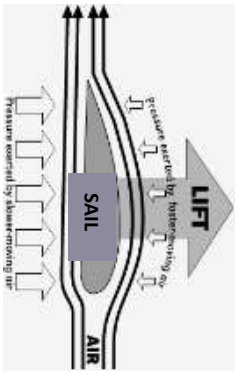
OUTHAUL. A line, or block and tackle, used for stretching the foot of a sail out along the boom.

How a sail works

Its likely that while riding in a car you have stuck your hand out the window and felt the wind. It is also probable that while doing this you changed your had position to feel the wind either push your hand back or perhaps it even made your hand lift up. Well, your hand was acting something like a sail when you did that. With that thought in mind condiser the drawing to the right. Imagine an airplane wing that acts like your hand. You can see the air on top of the wing travels a longer distance than the air below the wing. It is important to remember the air is moving at different speeds. Since the air is moving slower on the bottom it tends to push while the thinner air on top tends to pull the wing upward.



Now, turn that wing upright and rename it "sail" and you can begin to understand why a sailboat can sail into the wind.



The crew on a sailboat can change the angle of a sail in relation to the wind. They can also change the postion or shape of a sail (Trim) to make it operate more like the wing describbed above. By doing so the crew is really adjusting the speed at which the boat will travel.

Bernoulli's law

How do airplanes overcome gravity and how do sails create power to move a boat? When wind pushes against a sail, intuition suggests that a boat will be propelled (pushed) in the same direction as the wind. Remember your hand from above. That concept is clear when the wind is coming from astern, behind a sail. However, modern sloop rigged sailboats can be sailed at an angle 45° relative to the oncoming wind. Surely "push" is not the force propelling a sailboat to into the wind. So, how are boats able to sail into the wind at all? The secret is "lift." In addition to providing resistance (pushing), sails can also provide lift (pulling). Again, remember when your hand was lifted rather than pushed when it was out the window. When the wind blows across a sail, it is akin to an airplane wing turned vertical (see above). As Bernoulli's Law states, faster moving air across the longer side of an airfoil creates an area of low pressure. The low pressure translates into a pull (lift) in the same direction as the area of low pressure whether it relates to an airplane's wing or a sailboat's sail.

Types of Wind

There are two types of wind involved in sailing, true wind and apparent wind. True wind is provided by mother nature. It is the naturally occuring wind generated by the prevailing weather. You already know about this kind of wind from watching the weather reports on the evening news. Likewise, you know about apparent wind. That is the wind you feel when you run, ride your bike, or stick your head out of the car. The fast you go the stonger that wind feels. It is the wind due to your motion along with the true wind. In the past you may have run the cadet challenge where you ran great until you were running into the wind. Armed with this first hand knowledge you can imagine standing on a sailboat at the dock feeling the true wind from mother nature then getting underway feeling the wind from mother nauture (true) and the boats motion combining to become apparent wind as you sail out of the harbor.

Wind Direction

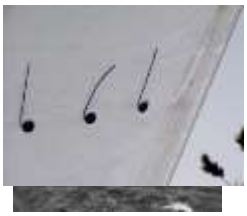
Wind Direction relative to the boat's course (heading) is one of the most critical things to keep in mind when sailing, regardless of your crew assignment. When a sailboat changes the direction it is traveling (heading), the relative wind direction across the boat also changes.

WIND ⇨   ⇦ WIND

After any heading change, the new relative wind conditions will result in a need to adjust (reposition) the sails. Visualizing this concept is fundamental to sound seamanship. Even small heading changes usually require sail adjustments to achieve maximum sail efficiency. Furthermore, even while holding a steady (non-changing) course, small but continual changes in wind direction and/or velocity often result in a need to make small sail adjustments. You probably remember when riding a bicycle in a straight line you had to make little adjustments by turning a bit this way or that on the handlebars. In nautical terms, these adjustments are known as "trimming." Learning to trim sails optimally for the immediate wind conditions is core knowledge for good sailing.

How is wind direction determined?

To determine wind direction one needs to be observant. Ashore trash can be observed blowing along the ground and flags can be seen flying in the breeze. Can you think of any other ways you can tell what the wind direction is? However, when offshore, even just a little offshore, it is more difficult to determine exactly where the wind is coming from, especially on a moving boat which is creating wind of its own. Since effective sailing requires precise wind direction information, most sailboats are equipped with a wind direction indicator ranging from expensive electronic instruments, to mast head flies, to cheap, simple yarn tell tails attached to shrouds or stays. All Sail Academy boats will have some type of wind indicator.



Note: Know where the wind is coming from at all times and you can sail your boat safely and fast. Lose track of the wind direction and at best you will just be sailing to slowly and at worst you may find yourself in unsafe conditions.

Steering a Sailboat

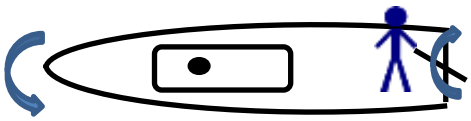
Sail boats are steered with a rudder --- a blade of wood, metal, or fiberglass extending vertically into the water at the stern (aft end) of the boat. The rudder is positioned right or left with a device called the "**Helm**." The **Helm** on small sail boats is usually a **Tiller** --- a long horizontal handle attached to the top of the rudder. Tillers are usually made of wood but can also be made of light weight metals. On larger boats, the **Helm** may be either a **Tiller** or a **Wheel**. Most Sail Academy boats have tillers, but a few have a wheel. A tiller provides the helmsman with instant steering feedback and is generally considered more responsive than a wheel. However, as boats become larger, tiller forces start to become physically unmanageable. Consequently, most boats over 33 feet long use wheel steering.

TILLER AND RUDDER WHEEL

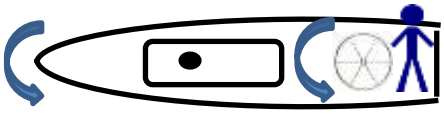
To steer a vehicle straight ahead, the steering wheel must be held relatively steady (not turned). The same is true of the HELM. The helm is the wheel or tiller controlling the rudder. The helmsman, the

crewman manning the tiller or the wheel, keeps a boat on a steady (non- changing) course by keeping the helm aligned with the boat's centerline. A centered helm means a centered rudder allowing the boat to sail straight ahead. Even the slightest helm movement off centerline causes turning. Therefore, holding a steady course (steering a straight line) requires constant visual attention to either a reference point on the horizon or a compass heading. However, tending the helm and holding a steady course is not a static activity. Because of ever present wave motion and wind variations, the helmsman is constantly moving the helm (tiller or wheel) slightly back and forth to steer a steady course. The averaging of this back and forth motion is the true helm centerline. Like steering a car, this slight but constant helm movement soon becomes instinctive.

Using a **Wheel Helm** is just like steering a car. The boat turns in the same direction the wheel is turned. However, tiller steering can be confusing because the tiller is moved in the opposite direction from the desired turn. When turning to port (the left), the tiller is moved away from centerline toward the starboard (the right) and when turning to starboard (the right), the tiller is moved away centerline toward port (the left). To stop a turn, the tiller is re- centered. If the tiller is not centered, the boat will continue to turn. Rate of turn (how fast the bow is changing direction) is proportional to the distance that the helm is displaced. The farther the tiller or wheel is moved, the faster the turn rate. Speed also effects turn rate. Fast boats are more responsive, turning more quickly and with less rudder deflection, than slower boats. However, sudden or large rudder deflections, especially on slow moving boats, will greatly increase drag and thereby reduce speed.



TILLER



WHEEL

Note: For many new sailors, operating a tiller is confusing and may be the most challenging thing you encounter at sail academy. Don't be discouraged, with practice; everyone eventually "gets it."

Weather Helm

As noted above, the helm must be centered or the boat will turn. However, to counteract sideways motion (leeway), the actual helm centerline must be adjusted slightly to windward of the boat's centerline. In other words, to keep the boat sailing on a straight course, the helmsman must point the boat's bow slightly into the wind by holding some windward helm pressure (**weather helm)**. Remember the idea of holding your hand out the window of a car? To hold your hand at a certain place you had to use your muscles and steady it. Well, that is similar to applying weather helm. Weather helm is strongest when sailing close hauled. In moderate to strong winds, significant weather helm will be evident while sailing close hauled (hard on the wind.) As a boat falls off from close hauled, weather helm progressively decreases. In fact, weather helm is negligible when running dead down wind.

Note: Excessive weather helm on any reach (close, beam, or broad) indicates an over trimmed (to close to centerline) boom and/or main sail. The jib might be over trimmed as well, but easing the main sheet or traveler will cure the condition. Once the main is properly trimmed the jib may also need to be re-trimmed. Boat speed always increases when excess weather helm is relieved.

Points of Sail

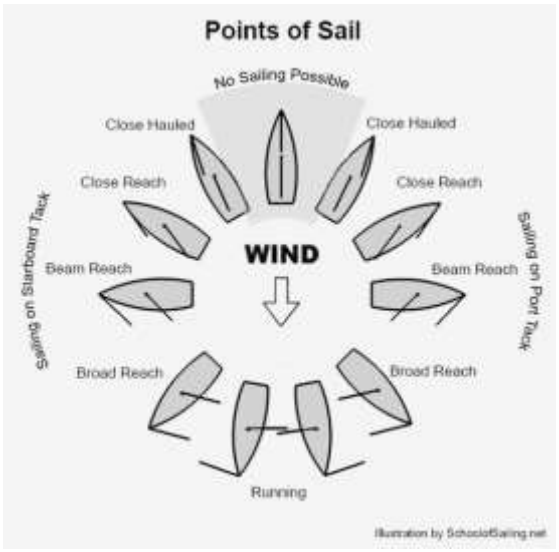
There are three precisely defined **primary Points of Sail**:

(1) Close Hauled (also called "Hard on the Wind" or "Beating")

(2) Beam Reach

(3) Run or "Running"

Other less precisely defined **points of sail** include **Close Reach** and **Broad Reach**. **Close Reach** is sailing on any heading between close hauled and a beam reach, while **Broad Reach** is sailing on any heading between a beam reach and a run.



This illustration shows the points of sail including the angular positioning of the boom and jib relative to the boat's centerline and the direction of the wind across the boat. Notice that as a boat sails closer into the wind, the angle between the boat's centerline and the sails gets smaller and smaller. When sailing Close Hauled, the sails are usually pulled in as close to centerline as the boat's rigging and equipment will allow. While running, the sails are usually extended as far out from the boat's centerline as the boat's rigging and equipment will allow. For all other points of sail, the angle between the sails and the boat's centerline lies somewhere between those extremes.

Fundamental Sailing Maneuvers

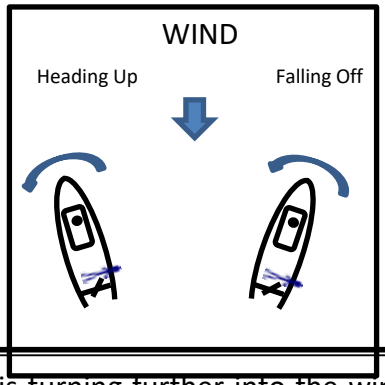
There are only two fundamental sailing maneuvers:

"HEADING UP" also called "COMING UP"

"FALLING OFF" also called "HEADING DOWN" or "BEARING AWAY."

Falling Off Heading Up

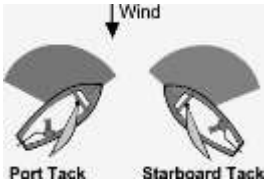
Heading Up is turning the bow into or toward the wind while Falling Off is turning the bow away from the wind.



Procedure: When the Helmsman gives the command "Heading Up", he is turning further into the wind. He might also, but not necessarily, advise the crew as to the new expected point of sail. The crew's response to the command "Heading Up" should be "Jib Aye" and "Main Aye" while immediately re-trimming (pulling in) the sails as the boat is turning. When the Helmsman gives the command "Falling Off", he is turning away from the wind. Again the Helmsman might or might not advise as to his anticipated point of sale. The crew's response to the command "Falling Off," should be "Jib Aye" and "Main Aye" while immediately easing (letting

Tacking

Tacking, also called **"**COMING ABOUT", is "bringing the bow through the wind" or turning completely through the NO SAIL ZONE. **TACKING** generally refers to sailing from a Close Hauled condition on one tack to a Close Hauled condition on the opposite tack. However, **TACKING** can be initiated from any point of sail and the new course may pass through and exceed a close hauled condition on the opposite tack. Because TACKING requires a full transit of the NO SAIL ZONE**,** it should only be attempted when the boat has sufficient speed (momentum) to ensure a complete turn. A steady rate of turn should be maintained until the opposite tack, or the new heading, is reached. If the turn is stopped before reaching the opposite tack, or the rate of turn is too slow, the boat may stall. Poor tacking techniques can result in becoming trapped in IRONS.

Wind on Port Boom on Starboard		Wind on Starboard Boom on Port

A correct and complete Point of Sail description will also include the **"TACK"** you are sailing on, either **(Starboard or Port)**. **Starboard Tack** means the wind is coming from the starboard (right) side of the boat; while, **Port Tack** means the wind is coming from the port (left) side of the boat. Some examples of complete point of sail descriptions include: "Close hauled on a port tack," "Broad Reach on a starboard tack," "Running on a port tack" and Close Reach on a starboard tack.

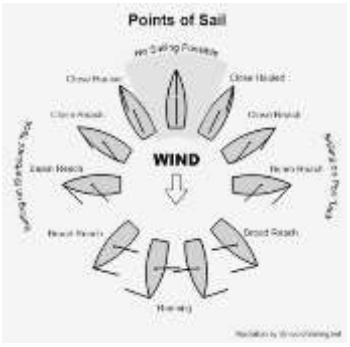
Note: Do not confuse the TACK you are sailing on (Port Tack or Starboard Tack) with TACKING. Tacking is a "sailing maneuver" where the bow of the boat is turned through the wind.

Procedure: To initiate a TACK, the Helmsman will loudly command either, "Prepare to Tack" or "Ready About." The jib and mainsheet handlers should loudly reply with, "Jib Aye and Main Aye." Upon hearing crew acknowledgements, the Helmsman, when ready, will command either "Helms A-lee," or "Hard A-lee," or "Tacking" and then turn into the wind. During the tack the main sheet is not released. The jib sheet is released just as the bow is coming through the wind and then the other jib sheet (new leeward sheet) is quickly pulled or winched in to a close hauled trim setting. Tacking requires that the crew be knowledgeable and work together. Good tacking is critical for fast and efficient upwind sailing.

A **JIBE** (Also called GYBE) or **JIBING** is an intentional turn where the stern (rear end of the boat) is brought through the wind. When a boat's stern is unintentionally allowed to turn through the wind, the result is an UNCONTROLLED JIBE **---** ***potentially dangerous. The danger involves the boom***. When sailing with the wind blowing from astern, the boom and mainsail are extended far out from the boat's centerline and on the opposite side from where the wind is coming from. During an intentional jibe the crew carefully tends the main/boom. **However, if the jibe is accidental (unintentional) the boom can swing freely with great force from one side of the boat to the other.** Not only is boat damage possible, but it can also lead to the possibility of a serious, even fatal, head injury. In light winds uncontrolled jibes are a mere embarrassment to good seamanship. However, in strong winds uncontrolled jibes can be very serious. Most crews will experience some uncontrolled jibes at Sail Academy. When it happens, ***EVERYONE AWARE OF THE SITUATION SHOULD IMMEDIATELY YELL OUT "JIBING." and COCKPIT CREW SHOULD IMMEDIATELY DUCK CLEAR OF THE BOOM!***

Procedure: To initiate a Jibe, the Helmsman loudly commands "Prepare to Jibe." The jib and mainsheet handlers should loudly reply with "Jib Aye", and "Main Aye." Upon hearing crew acknowledgements, the Helmsman, when ready, will command either "Helms A-weather" or "Jibing" at which time he/she smoothly turns the boat away from the wind. As the turn begins, the mainsheet trimmer smartly pulls in the main sheet. As the stern goes through the wind all of the main sheet slack should be fully taken in. Any remaining main sheet slack will allow the boom to swing hard to the new leeward side of the boat. Consequently, all main sheet slack should be fully taken in before the stern crosses the wind. Just as the stern crosses the wind line, the Helmsman loudly shouts "Jibe-O." This notifies the crew that it is safe to re-position the boom. Upon hearing Jibe-O, the main sheet trimmer immediately releases the main sheet cleat and eases the main sheet until a proper boom position is achieved for the new point of sail. Skilled jib sheet trimmers will continually trim as the boat turns keeping maximum power in the jib throughout the jibe. If necessary, the jib is positioned to leeward after the new course is set.

Area of No Propulsion



Notice that the illustration on the previous page includes an area in addition to the points of sail, an area where no sailing is possible commonly termed: **"AREA OF NO PROPULSION"**. This area is also referred to as the **"NO SAIL ZONE"** or **"NO GO ZONE.**" This is a real, physical limitation because sailboats simply cannot be sailed directly into the wind. Modern sloop rigged sailboats, like those at the Sail Academy, can sail about 45**°** relative to the oncoming wind. Since sailboats can be sailed ± 45° either side of head to wind, the total **AREA OF NO PROPULSION** is a quadrant of approximately 90**°.**

Note: When deliberately changing course, a boat may be turned completely through the Area of No Propulsion. However, a boat cannot be sailed for more than a few moments while headed anywhere within this zone or it will soon begin to slow down (lose forward momentum). If this condition is not corrected by deliberately turning away from the wind either to port or starboard, the boat may lose all forward momentum and become stalled or "Dead in the Water" or "In Irons".

Irons

When a boat is headed into the wind (within the Area of No Propulsion) and becomes fully stalled (i.e., all forward momentum is lost), the boat has become trapped in a condition known as "IN IRONS." A boat trapped IN IRONS has no steerage and is totally at the mercy of the wind, waves and currents. With no control over the boat, this condition can be dangerous, especially if there are other boats nearby or if the area is in shallow or restricted waters. Boats trapped "IN IRONS" should be recovered to an "IN CONTROL," safe sailing condition as quickly as possible. Recovery from IRONS is not complicated and procedures will be covered as part of the Sail Academy syllabus.

Situational Awareness (PB&J)

Wind Direction, Steering, Points of Sail, Sail Trim, Weather Helm, Heading Up, Falling Off, Tacking, Jibing, and Irons have all been discussed, but a unified understanding of these concepts will help make sailing safe, efficient, and FUN. In tying these concepts together think of a PEANUT BUTTER and JELLY (PB&J) sandwich. PB&J will help you recall basic sailing information.

Every time your boat changes heading, think "PB&J" where:

"P" = **Point of Sail** **"B" = Boom Position** **"J"** = **Jib Position**.

Small heading changes require only small sail trim adjustments, but heading changes of 20 degrees or more may result in a new Point of Sail where substantial repositioning of both the main and jib sails are necessary. Know the Points of Sail Diagram cold and remember which running rigging components affect sail trim!

Main Sail is Positioned/Trimmed by:	Jib sail is positioned/trimmed by:
Main Sheet	Jib Sheet
Traveler	Jib Fair-Lead Position
Voom-vang	Jib Halyard
Down Haul	Jib Leach Cord
Out Haul	Backstay
Main Halyard	
Main Leach Cord	

Pinching

Inadvertently heading into the NO SAIL ZONE usually occurs when sailing Close Hauled. When close hauled, any and all crew members who notice that the helmsman is drifting into the NO SAIL ZONE, should immediately and loudly yell back to the helm with a call of either **"PINCHING"** or **"FALL OFF."** These calls alert the helmsman that he/she is drifting into the NO SAIL ZONE and a steering correction away from the wind is needed. The windward jib sheet trimmer is usually in the best position to notice the drift. However everyone who notices that the boat is veering in the NO SAIL ZONE should notify the helmsman immediately**.**

Loud calls of "Pinching" or "Fall Off" are not rude. They are great teamwork. Make Those Calls!

Boat Trim and Balance

Trim is the fore and aft balance of the boat. The aim is to adjust the moveable ballast (crew weight) forward or backward to achieve an 'even keel' level boat. In small boats (20 feet or less) the crew, when sailing upwind, usually sits slightly forward of the center of gravity. When running, it is usually more efficient for the crew to sit at or slightly behind the center of gravity. On larger boats, the fore and aft positioning of the crew is less critical. However, on larger boats, added crew weight forward (toward the bow) is usually more detrimental to boat speed than added weight aft.

Balance refers to athwart ships (port and starboard) heeling. The aim is to distribute crew weight 'inboard' or 'outboard' of centerline to either create heel or to prevent excessive heel. In very light winds, crew weight should be shifted leeward to create heel. By heeling the boat leeward (away from the wind) gravity will help the sails fall into proper position. In strong winds, crew weight should be shifted windward to reduce heel and thereby reduce drag. While beating in very strong winds, crewmen are often seen sitting on, and even leaning outboard on, the upwind rail. This helps to reduce heel and thus reduce drag allowing the boat to sail faster. Under all conditions except running, the boat should be heeled at least slightly to leeward. Running, the boat should be level or heeled slightly toward the boom regardless of where the wind actually lies, e.g. intentionally sailing by the lee. Accept when running by the lee, heeling to windward is always bad because the sails will not be able to shape properly.

Sail trimming

Sail trimming is a very complex subject. However, when reduced to bare essentials, a sail should be trimmed in until it just fills with wind, but no further than the point where the front edge (luff) of the sail is exactly in line with the wind. When a sail is under trimmed (too loose) the luff will collapse and flutter. In this case, the sail's sheet should be hardened (trimmed in) just enough so the luff aligns with the wind and the sail takes on a smooth airfoil shape. It is much harder to determine if a sail is over trimmed. To check for an over trim condition, sail trimmers should frequently ease out their sheets. If the luff remains smooth and is not starting to collapse, the sail was over trimmed. Keep easing the sheet until the luff just begins to collapse and then harden just enough to smooth out the luff. The most common tendency for new sailors is to over trim the sails (pull the sheets in too tight).

Remember and heed the sail trimmer's mantra:

"When in doubt, let it out."

The jib is generally easier to trim than the main, first because of multiple tell-tails attached to the luff and second because the jib is forward of the crew's line of sight. This visual perspective makes it easier to see the airfoil shape of the jib. On the other hand, the main sail is directly over the crewmen and this positioning makes it visually more difficult to see the actual shape of the sail. To help give the crew some perspective on main sail trim, several tell-tails are usually attached to the leach of the main sail. When all the leach tell-tails are smoothly streaming aft, the main sail is generally well trimmed.

To assist sailors with trimming, pieces of yarn or other light weight material are attached to a stay, other wires associated with the mast or to the sail. They are used in pairs one on each side of the boat or sail. These trim indicators are called tell-tails.

Reefing is a technique for reducing power by physically making a sail smaller. Main sails usually have one or two sets of reef points. The reef points include reinforced metal grommets (cringles) for attachment to the boom. To reef the main, head into the wind, lower the main halyard until the reef points are in line with the boom, attach the tack and clew cringles to the boom, tighten the main halyard, resume course, then roll the extra main material up and lash it to the boom at the other reef cringles. Jibs are not usually reefed, so when a smaller jib is required, the jib is hauled in (lowered) and a smaller jib is hoisted.

HELMSMAN'S COMMANDS

And CREW RESPONSES

Helmsman's Commands

Maneuver	Preparatory Command	Execution Command
Tacking	"Prepare to Tack" or "Ready About"	"Tacking"
Jibbing	"Prepare to Jibe"	"Jibbing"
Turning into the wind	"none"	"Heading Up"
Turning away from the wind	"none"	"Falling Off" or "Bearing Away" or "Heading Down"

Crew Response to Helmsman's Preparatory Commands

Maneuver	Preparatory Command	Crew's Verbal Response
Tacking	"Prepare to Tack" or "Ready About"	"Jib Aye" & "Main Aye"
Jibbing	"Prepare to Jibe"	"Jib Aye" & "Main Aye"
Turning into the wind	"none"	"Heading Up Aye"
Turning away from the wind	"none"	"Falling Off etc., Aye"

Crew Action upon Helmsman's Execution Commands

Maneuver	Execution command	Crew Action
Tacking	"Tacking"	Release Jib as bow passes the wind Pull Jib around and tighten to close hauled Main Sheet held fast, Adjust Traveler
Jibbing	"Jibbing" Jibe-O as stern crosses the wind	Main Sheet in ASAP Jib trimmed throughout turn Main Sheet out as necessary Jib across if appropriate
Turning into the wind	"Heading Up"	Harden (pull in) Sheets
Turning away from the wind	"Falling Off" or "Bearing Away" or "Heading Down"	Ease Out (loosen) Sheets

GLOSSARY

ABEAM. A direction at right angles to the keel of a boat.

ABOARD. On or within the boat.

ABOUT. On the other tack.

AFT. At, near, or toward the stern.

AGROUND. Touching or fast to the bottom.

AHEAD. Toward the bow or forward.

A-LEE. To the leeward side. Away from the direction of the wind. Opposite of windward.

AMIDSHIPS. In or toward the center of the boat.

APPARENT WIND. The wind perceived in a moving boat which is the combination of the true wind and the motion of the boat.

ASTERN. The bearing of an object 180 degrees from ahead.

ATHWART SHIPS. At right angles to the centerline of the boat.

A-WETHER. To the Windward side. Into the direction of the wind. Opposite of A-lee.

BACKSTAY. A rope or wire bracing a mast from aft and leading from the masthead to the rail or transom. (part of the standing rigging)

BACKWIND. When wind is deflected from one sail to the lee side of another sail, as when the jib is back-winding the main.

BAIL. To throw water out of the boat.

BARE POLES. When no sails are set.

BATTEN. A thin semi-rigid strip fitted into pockets for stiffening the leech of a sail.

BEAM. The greatest width of the boat.

BEAM REACH. Sailing with the apparent wind coming at right angles to the boat.

BEAM WIND. A wind at right angles to a boat's course.

BEAT. To sail to windward, generally in a series of tacks. Beating is one of the three points of sailing, also referred to as sailing close hauled, or by the wind, or on the wind.

BEATING TO WINDWARD. (1) Making progress against the direction of the wind when sailing on the wind or close- hauled. (2) Sailing to windward by zigzag tactics.

BEFORE THE WIND. Traveling in the same direction the wind is blowing toward; sailing before the wind is a point of sailing, also called running.

BLOCK. An apparatus consisting of an outside shell and a sheave through which a line may be passed.

BOAT HOOK. A staff with a hook at one end used for fending off or holding on.

BOLT-ROPE. Line attached to the foot and luff of a sail to give it strength or to substitute for sail slides.

BOOM. A spar used for extending the foot of a fore-and-aft sail.

BOOM-VANG. A tackle running from the boom to the deck which will flatten the curve of the sail by pulling down on the boom.

BOW. The forward part of a vessel.

BOW LINE. A docking line leading from the bow.

BOWLINE. A knot used to form a temporary loop in the end of a line.

BOUY. A floating beacon.

CAPSIZE. To overturn.

CARS. Adjustable blocks that lead sheets.

CAST OFF. To let go.

CENTERBOARD. A wooden or metal board carried in a fore- and-aft trunk and capable of being lowered into the water to overcome the leeway of a boat sailing on the wind.

CHAFE. To wear by rubbing.

CHAIN PLATES. Stainless steel strips bolted to the sides of a boat for securing the lower ends of shrouds and stays. (part of the standing rigging)

CLEAT. A fitting of wood or metal with horns, used for securing lines.

CLEAT HITCH. A knot used to secure a line to a cleat.

CLEW. The after lower corner of a fore-and-aft sail.

CLOSE-HAULED. Sailing close to the wind; same as on the wind, hard on the wind, or by the wind, or on a beat.

COCKPIT. The well of a sailing vessel, especially a small boat, for the tiller or the wheel and the helmsman.

COME UP. Steer toward the eye of the wind. (see HEAD UP and FALL OFF)

COURSE. The point of the compass toward which the boat is steering.

CRINGLE. A ring sewn into a sail through which a fitting or line may be passed.

CUNNINGHAM. A grommeted hole in the mainsail luff slightly above the foot through which a line or hook is pulled downward to exert stress on the luff, thereby flattening the sail.

DEAD AHEAD. Directly ahead on the extension of the fore- and-aft line of the boat.

DISPLACEMENT. The weight of the water displaced by a vessel.

DOWSE. To take in or lower a sail; to put out a light; to cover with water.

DOWNHAUL. (1) A rope led from the head of a headsail and through a block at the foot of the stay for hauling down the sail. (2) Tackle attached to a gooseneck fitting used to adjust the tension along the luff of a sail. (running rigging)

DRAFT. The depth of water to the lowest part of a vessels keel.

DRIFT. The leeway of a boat or amount of set of a tide or current.

EASE OFF or EASE UP. To slack up.

ENSIGN. (1) The national flag. (2) A junior officer in the U.S. Navy.

FAIR-LEAD. An eye to furnish a clear lead.

FALL OFF. To turn the bow of the boat away form the eye of the wind.

FENDER. Canvas, wood, rope, or molded rubber bumpers used over the side to protect a boat from chafing.

FEND OFF. To push off when making a landing.

FETCH. To make a windward mark without making another tack.

FIGURE EIGHT KNOT. A knot in the form of a figure eight, placed in the end of a line to prevent the line from passing through a grommet or block.

FLATTEN. To flatten the shape of a sail by hauling in on a sheet, or an outhaul, or a flattening reef, or a boom vang, or a Cunningham, or by tensioning a halyard or a Back Stay.

FORE-AND-AFT. In the direction of the keel.

FOUL. Jammed, not clear.

FOOT. The lower edge of a sail.

FURL. To roll up a sail on top of a boom or spar and secure it with small lines.

GEAR. The general name for ropes, blocks, and tackles, etc.

GIVE–WAY VESSEL. A term used to describe the vessel which must yield in meeting, crossing, or overtaking situations.

GROUND TACKLE. A term used to cover all of the anchor gear.

GUDGEONS. The eye supports for the rudder mounted on the transom which receive the pintles of the rudder.

GYBE. Alternative spelling for JIBE

HALYARD. A line or wire used to hoist sails or flags.

HARD-A-LEE. To put the tiller all the way down, leeward when coming about.

HEAD. The upper corner of a triangular sail. Also a marine toilet.

HEADER. A change in wind direction which will head or impede progress in the intended direction.

HEADSAILS. Sails forward of the foremost mast.

HEADSTAY. Also known as the Forestay. A forward stay bracing a mast from the bow and leading from the bow to the masthead (standing rigging).

HEAD UP. Steer toward the eye of the wind. Same as COME UP or HARDEN UP.

HEADWAY. The forward motion of a boat. Opposite of sternway.

HEAVE TO. To bring a vessel up to a position where it will maintain little or no headway, usually with the bow into the wind or nearly so.

HEEL. To tip to one side temporarily because of an external force such as the winds pressure on the sails. Also the base or bottom of the mast.

HELM. The wheel or tiller controlling the rudder. (Also see LEE HELM AND WEATHER HELM)

HELMS A-LEE. To put the tiller all the way down, leeward when coming about. (Used interchangeably with HARD A-LEE or TACKING)

HELMS A-WEATHER. To pull the tiller all the way up, windward when jibing. Used interchangeably with JIBING.

HOIST AWAY. To raise a sail, pennant, or spar.

IN IRONS. Stalled. Said of a sailboat headed into the eye of the wind and refusing to fall off, with no wind pressure on either side of the sails.

IRISH PENANT. An untidy loose end of a rope.

JIB. A triangular sail set forward of the mainmast (sloop, cutter, ketch, yawl) or the foremast (schooner).

JIB SHEET. A line, usually paired, controlling the lateral movement of the jib. (part of the vessels running rigging)

JIBE. The maneuver of changing the sail (and boom) from one side of the boat to the other. Usually used as a method of changing course while keeping the wind astern.

JURY RIG. A makeshift rig.

KEEL. The structural member running fore-and-aft along the vessels centerline and forming the vessels backbone.

KNOT. A measure of speed equal to one nautical mile (6,076.1 feet) per hour.

LAY. To *lay* a mark is to be able to reach it without tacking, close hauled. The lay of a line is the direction in which its strands are twisted.

LEE. Leeward side of the boat. Away from the wind.

LEECH. The after edge of a fore-and-aft sail.

LEE HELM. The condition, in a sailing vessel, when the helm must be kept to leeward to hold the boat on her course. This condition is potentially dangerous and usually indicates a standing rigging misalignment.

LEE SHORE. The land to leeward of the vessel.

LEEWARD. The direction away from the wind. Opposite of windward.

LEEWAY. The sideways movement of the boat caused by either the wind or tide.

LIFT. An increase in the winds force, causing an increase of heel of a boat close hauled, shifting the center of effort forward, allowing the boat to sail, often advantageously, closer to the wind and faster; sometimes said of any similarly advantageous shift in wind direction; being lifted is the opposite of being headed.

LINE. Rope and cordage used aboard a vessel.

LOWER SHROUDS. The shrouds which run from the chain plates on the sides of the boat to the mast just beneath the intersection of the spreaders.

LUFF. The forward edge of a sail; also the action of heading up into the wind causing the forward part of the sail to flutter.

MAINSAIL. The principal sail that sets on the mainmast and spread by the main boom.

MAINSHEET. The sheet controlling the athwart ships movement of the mainsail. (part of the running rigging)

MAST. A spar set upright to support booms, rigging and sails.

OFF THE WIND. Sailing downwind (away from the eye of the wind).

OUTHAUL. A line, or block and tackle, used for stretching the foot of a sail out along the boom. (part of the running rigging)

PAINTER. A line attached to the bow of a boat for use in towing or making fast.

PINCH. To sail a boat too close to the wind (slightly into the No Sail Zone) causing the sails to stall.

PINTLE. The pin-like fittings of the rudder which are inserted into the gudgeons mounted on the transom.

PORT. The left side of a boat when looking forward. A harbor.

PORT TACK. Sailing with the wind coming over port side of the boat causing the boom to be on the starboard side of the boat.

PRIVILEGED VESSEL. A vessel which, according to the applicable rules of the road, has right-of-way. (The tern Privileged Vessel has been superseded by the term "STAND-ON VESSEL")

PUFF. A term used to describe a gust of wind.

QUARTER. The corners of the transom; the sides of a boat aft of amidships.

REACH. The point of sailing between close hauled and running, one of the points of sailing. Subdivided into *close, beam and broad* reach.

READY ABOUT. The preparatory command given before "helms a-lee" or "hard a-lee or "tacking" when executing a tack (passing the bow through the eye of the wind).

RIG. The arrangement of a boats sails, masts, and rigging.

RIGGING. The general term for all the lines and fittings of a vessel.

ROACH. The outward curve at the leech of a sail.

ROLLER FURLING. Type of jib rigged to furl by rolling up around its own luff.

RUDDER. A vertical plate or board for steering a boat.

RUDDER HEAD. The top of the rudder post and the attaching point for the tiller.

RUDDER POST. The vertical post upon which the rudder and rudder pintles are attached.

RULES OF THE ROAD. The regulations governing the movement of vessels in relation to each other, generally called steering and sailing rules.

RUN. To allow a line to run freely.

RUNNING. The point of sail when sailing with the wind coming from directly astern. Also referred to as sailing before the wind. Also referred to as SAILING FREE.

RUNNING RIGGING. Those parts of the ships rigging that are movable and rove through blocks, such

as halyards, sheets, toping lifts, downhauls, boom-vangs, outhauls, etc., used for raising and adjusting sails.

SAILS. Flexible vertical airfoils, generally made of synthetic cloth, that use wind pressure to propel a boat.

SCULLING. Moving the tiller or an oar back and forth to propel a boat ahead.

SEA ROOM. A safe distance from the shore or other hazards.

SEA WORTHY. A boat or a boat's gear able to meet the usual sea conditions.

SECURE. To make fast.

STARBOARD TACK. Sailing with the wind coming over the starboard side of the boat with the boom out over the port side of the boat.

STAY. That part of the standing gigging supporting the mast from forward and aft.

STERN. The after part of a vessel.

TACK. The lower forward corner of a fore-and-aft sail. To come about by putting the helm down and bringing the bow through the wind. To sail with the wind on a given side of the boat, as sailing on a starboard or a port tack.

TACKING. Moving the boat's bow through the wind's eye from close hauled on one tack to close hauled on the opposite tack. Same as COMING ABOUT.

TILLER. A bar or handle for turning a boat's rudder or an outboard motor.

TOPPING LIFT. A line used to support the weight of or adjust the horizontal set of a spar (boom or spinnaker pole).

TRANSOM. The stern cross-section of a square sterned boat.

SET. The direction of the leeway of a vessel, or of a tide or current.

SHEET. The line used to control the forward or athwart ships movement of a sail.

SHEET BEND. A knot used to join two ropes. Functionally different from a square knot in that it can be used to join lines of different diameters.

SHIPSHAPE. Neat, seamanlike.

SHROUD. The standing rigging that supports the mast at the sides of the boat.

SLOOP. A single massed sailing vessel with working sails (jib and main) set fore and aft.

SPAR. A general term used for masts, yards, booms, etc.

SPREADER. A horizontal strut fitted to the mast and used to increase the angle at which the shrouds

approach the masthead.

SQUARE KNOT. A knot used to join two lines of similar diameter. Also called a reef knot.

STANDING RIGGING. Permanent shrouds and stays that support the mast.

STAND-ON VESSEL. The vessel which has the right-of-way during a meeting, crossing, or overtaking situation.

STARBOARD. The right side of a boat when looking forward.

TRAVLER. A device that allows sheets to slide athwart ships. TRIM. Fore and Aft balance of a boat.

TRUE WIND. The actual direction from which the wind is blowing.

UNDERWAY. Vessel in motion, i.e., when not moored, at anchor, or aground.

UPPER SHROUDS. The shrouds which run from the chain plates at the sides of the boat over the spreaders and up to the masthead.

WAKE. Moving waves, track or path that a boat leaves behind it, when moving across the water.

WAY. Movement of a vessel through the water such as headway, sternway or leeway.

WEATHER. Windward side of the boat.

WEATHER HELM. The tendency of a boat to turn into the wind when its rudder is set amidships.

WINDWARD. Toward the direction from which the wind is coming.

WING AND WING. Running with the mainsail set on one side of the side and the jib set on the other side.