Star of India

Sail Training and Seamanship Manual

Introduction

Welcome aboard the *Star of India* Sail Training Program. You are about to participate in a truly unique experience. Through this course, you will receive hands-on training in the art of sailing a tall ship. The oldest active sailing ship in the world, the 1863 barque *Star of India*, will serve as your classroom. Your teachers will be active *Star of India* crewmembers.

This manual details the information you will be expected to know to pass this course. Other ships may use different methods and terms, but we teach the ones specifically used to sail the *Star*. This manual also includes an appendix containing terms and definitions; you will only be required to know the terms used in the text of this manual.

Your coursework will generally follow the outline of this manual, which begins with the history of the *Star of India*. It is important that you learn the *Star*'s history for several reasons. The first is that you are becoming part of that history. It is not enough to save the *Star* as a museum, it is also one of our primary goals to maintain the knowledge to sail the *Star*. The second is that you are now a Maritime Museum ambassador to our guests. Our guests are frequently interested in the *Star*'s history; go ahead, share your newly found knowledge. Finally, the *Star* represents state-of-the-art, Civil-War-era technology. Many have come before you and performed the tasks you will learn. Tall-ship crews typically were uneducated, and were frequently recruited through less than scrupulous means. When things get challenging, remember you're an educated citizen of the 21st century. If the old timers could learn to sail tall ships in the eighteenth century, you can learn to do so today.

Other topics you will learn include basic terminology and the parts of the *Star of India*. You will learn the difference between running and standing rigging, a crucial bit of knowledge that is essential to both the safe operation of a tall ship and your personal safety. You will learn line handling and the names of each yard, mast, line, and part of the ship. You will learn the differences between square sails and fore-and-aft sails. Basic sailing will also be taught.

Safety is perhaps the most important topic you will be taught. Please remember that the *Star* is a 19th century artifact, and comes from a time when the safety of individual crewmembers was less important than it is today. This makes our system of precautions and relentless attention to safety especially important. Our foremost objective is to maintain and operate the *Star* in a safe manner at all times to protect our crew and guests. Therefore, we have very explicit rules that cover work on deck and aloft, and they are strictly followed.

Yes, students who pass the physical part of the training and learn the rules for climbing and working aloft will have the opportunity to go aloft. These students will learn how to lay aloft, lay to the yards, furl sail, and lay back to the deck.

Finally, you will learn the steps and commands used during maneuvers such as tacking, and the basic knots used aboard the *Star of India*.

As a trainee your job is to listen, learn, ask questions, and follow the orders of your instructors. You have a lot to learn in a short period of time. We are excited that you have volunteered for the sail training program and will do our utmost to teach you how to sail the *Star of India.* Let's begin.

A Brief History of the *Star of India*

Launching

On Saturday, November 14, 1863, an iron-hulled vessel built for general cargo and passenger service under British registry was launched from the yard of Gibson, McDonald, & Arnold at Ramsey, Isle of Man. This craft was one of the first iron ships constructed. She was originally named *Euterpe* after the ancient Greek muse of music and lyric poetry.

The ship was constructed for the mercantile firm of Wakefield, Nash, & Co., and was christened with a bottle of port wine by a Mrs. Brown, wife of one of her owners. She was to be employed principally in the India trade, carrying cargoes of finished goods and raw materials between England and India via the Cape of Good Hope.

Euterpe was launched without masts as was the custom at the time but was fully rigged four weeks later as a three-masted ship. The building cost of the vessel was 25,000 English pounds. *Euterpe*/*Star of India* survives today as the oldest active sailing ship in the world, due in part to her wrought-iron hull, which was 15/16" thick at the keel and 5/8" thick at the main deck level.

For historical perspective, consider that the *Euterpe's* launching took place five days prior to Lincoln's Gettysburg address. In England, it was the reign of Queen Victoria, a time of industrial revolution and a rapidly expanding commercial and colonial empire.

Commercial History

On January 9, 1864, *Euterpe* departed England on her first voyage with Captain William Storry in command. Four days out she collided with an unlighted brig off the coast of Wales. Damage was considerable but the captain thought repairs could be made without returning to port. However, as most of the crew refused to proceed, Captain Storry decided to put back to Liverpool for the safety of the ship and cargo, and to avoid a mutiny. When the ship reached port, seventeen of the rebellious crew were committed to jail. Aboard ship the captain's word was law, and those who disobeyed were punished.

The ship was soon repaired and set off for India with a new crew. This voyage from Liverpool to Calcutta and return took eighteen months. A few days after returning, a fire was reported on board. Very little damage was done, but it was suspected that a disgruntled crewman set the fire.

On her second voyage to India, *Euterpe* was forced to slip her cable and leave Madras in the face of a Bay of Bengal cyclone. During this storm, her top masts were cut away to keep her from foundering. She was later repaired at Trincomalee and Calcutta, but on the passage home Captain Storry, her first master, died of tropical fever and was buried at sea.

Having experienced such misfortune on the first and second voyages, Wakefield, Nash, & Co. sold the *Euterpe* to East India Merchant David Brown, who continued to use her in carrying general cargoes to and from India. Under Brown's captains, she made four more voyages to India.

The opening of the Suez Canal in 1869 – which lopped 4,000 miles off the sea route to India – enabled steam-powered ships to compete with sail in this lucrative sea trade. *Euterpe*, like other great wind ships of that time, was relegated to lower priority, long-distance sea routes where the mechanical predictability of speed was not as important.

In October 1871, *Euterpe* entered the heyday of her long commercial career. With her purchase by the Shaw Savill Company (later Shaw, Savill, & Albion after a merger), her role in carrying emigrants and cargo between England, New Zealand, and Australia began.

On outbound passages *Euterpe* carried up to 409 passengers – mostly emigrants – from the British Isles over 18,000 miles via the Cape of Good Hope to the new colonies in New Zealand. Each of these outbound voyages took between three and four months. She returned to England by way of Cape Horn, covering about 14,000 miles following the prevailing winds and currents of the great southern ocean. Under the Shaw, Savill, & Albion house flag she rounded the world twenty-one times, occasionally calling at San Francisco, and at Chilean and European ports. Each of these round-trip voyages took approximately one year to complete.

On October 4, 1897, *Euterpe* left the East India Dock, London, for the last time. After touching in New Zealand and Australia, she sailed on to Hawaii. The advancing technology of the age had displaced *Euterpe* from her appointed sea routes – this time with faster, more economical steamships capable of regular, reliable service.

Early in 1898, Shaw, Savill, & Albion sold *Euterpe* to J.J. Moore of San Francisco, who in turn sold her later that year to Lincoln Spencer of Hawaii. This placed the former British ship under Hawaiian registry. (Note: A temporary certificate of Hawaiian registry was issued at Seattle for the vessel by the Hawaiian consul, who, in doing so, was acting contrary to his orders from the Hawaiian executive.) In July 1898, Hawaii was annexed to the United States and *Euterpe* became a party to court fights concerning her registry. On June 14, 1900, Congress passed the Hawaiian Organic Act. It contained a provision that the *Euterpe* and four other ships claiming Hawaiian registry which were owned by American citizens before August 12, 1898, were to be entitled to full American registry.

On October 30, 1900, *Euterpe* officially became an American ship, owned by the Pacific Colonial Shipping Company. From 1898 to 1901 *Euterpe* sailed between the Pacific Northwest, Hawaii, Australia, and San Francisco carrying various cargoes including sugar, lumber, and coal.

In January 1901, Pacific Colonial sold *Euterpe* to the Alaska Packers Association of San Francisco – a salmon fishing and packing company (which survives today as the Del Monte Company). A shipyard visit the following winter prepared her for her new role of carrying fishermen, cannery workers, and supplies to the Alaskan salmon grounds each summer. While in the yard her hull was painted black and she was changed in rig from a full-rigged ship to a bark by removing the yards from the mizzenmast for better sailing to windward and to reduce the crew required to sail her.

During that same winter of 1901-1902, extra water tanks were placed in her hold and a new donkey engine and boiler were installed in the rebuilt deckhouse. A Chinese three-pot galley was set up to starboard of the forward hatch. The poop and after cabin were extended forward to the mainmast shrouds to provide quarters for up to fifty-four fishermen and cannery hands. Tiers of bunks built into the after end of the ‘tweendeck accommodated sixty-three more. The rest – up to a total of over two hundred – were quartered forward.

Between March and September 1902, *Euterpe* made the first of twenty-two annual voyages between San Francisco and the salmon fisheries in Bristol Bay and Nushagak, Alaska, and back. On the trip

up, which covered approximately 2,700 miles and took 4-6 weeks, she was loaded with a multitude of items to support the cannery operations plus the polyglot ship's company of fishermen and cannery hands.

On the 3-4 week return trip she brought back the same passengers and her hold was filled with 20,000-35,000 wooden crates of canned salmon. En route, the chief diversion on board was gambling, with fan-tan games operated under the aegis of the Orientals in the fishing crew. Her small group of sailors performed wheel and lookout watches, and all manner of maritime housekeeping tasks were accomplished and duly recorded.

By 1906, the Alaska Packers Association assembled a fleet of eight iron and steel sailing ships, with the *Euterpe* being the first of the iron-hulled ones. They changed all of the sailing ships' names to *Star of* ----- following the lead of four ships purchased from the Corry's Irish Stars line out of Belfast, Ireland. In that year the *Euterpe* was renamed *Star of India*, thus commemorating her trade with that country in the 1860s.

A new anchor, replacing one lost in 1907, was brought aboard during the 1907-08 winter, along with two 135-fathom lengths of chain from the *Star of France*. New fishermen's quarters with berths were installed in the after part of the 'tweendeck.

After arriving home on August 30, 1923, from her last trip north, the *Star of India* was finally laid up with other sailing ships of the Star fleet at Alameda, California.

History with the Maritime Museum

Inspired by efforts made on the East Coast to save the *Benjamin R. Packard*, a small group of public-spirited citizens became interested in establishing an aquarium/maritime museum in San Diego in the mid-1920s. At the time, the city waterfront was less attractive to the public and it was hoped that a great sailing ship would create a cultural centerpiece, house aquaria and other marine curiosities, and serve as the terminus of a link between Balboa Park and the bay. After considering three available ships, the Aquarium Committee of the San Diego Zoological Society purchased the *Star of India* for $9,000 in 1926. The money was provided by "Sunny Jim" Coffroth of San Diego after listening to an appeal by a long-time friend, Jim MacMullen, the father of Jerry MacMullen (newspaper reporter, World War II and Korean Conflict Navy veteran, well-known maritime historian, co-founder and later president of the San Diego Maritime Museum Association).

The *Star* was towed to San Diego in 1927 and began her life as a museum ship. It was a downhill career with little being done to maintain her until 1957 when the skid was halted and gradually turned around following a visit by former square-rigger master Captain Alan Villiers. Captain Villiers' tirade against her run-down condition, duly reported in the San Diego Union, sparked a resurgence of pride in the old vessel and a refurbishment effort was begun. Her ultimately successful restoration forged ahead with growing support, and on July 4, 1976, she sailed again for the first time since 1923. She is now maintained in an operational, ready-for-sea condition.

She continues to sail for her birthday, about every other year in November. She sailed three times in 2013 for her 150th birthday celebration.

Star of India is the oldest iron sailing ship afloat in the world, and the oldest ship of any type still able to sail on a regular basis in the open ocean. As such, she is a gallant survivor of the glorious age of sail and of the "iron men" who took such vessels around the world.

Following is an abbreviated chronology of the *Star*'s long history through the year 2013.

1864-1871	General cargo trade between Britain and India.
1871-1898	Emigrant trade between Britain and New Zealand in employment of Shaw, Savill, & Albion Line.
1898-1901	Lumber trade between U.S., Australia, and Hawaii with Pacific Colonial Shipping Line. Registered as a United States vessel at Honolulu in 1900.
1901	Sold to Alaska Packers Association and re-rigged as a bark.
1902-1923	Operated by Alaska Packers Association under U.S. registry. Sailed annually between San Francisco and Nushagak, Alaska, in support of the Alaska salmon industry, wintering in Alameda, California.
1906	Renamed *Star of India* by Alaska Packers Association.
1923	Returned from last Alaska voyage, retired, and laid up at Alameda.
1926	Purchased by the Aquarium Committee of the San Diego Zoological Society.
1927	Towed to San Diego.
1934	USS *Constitution* visits San Diego harbor
1957-1976	Restoration period.
1966	Designated as a Registered National Historic Landmark by U.S. Dept. of the Interior
1976	4th of July: *Star of India* sails again for the first time in 53 years!
1984	11th of November: *Star of India* sails.
1986	15th of May: *Star of India* sails.
1989	28th of May: *Star of India* sails.
1993	14th, 22nd of August: *Star of India* sails.
1996	10th, 11th, 18th of August: *Star of India* sails.
1998	9th of August: *Star of India* presented with the World Ship Trust Award.
1998	9th, 15th, 16th of August: *Star of India* sails.
1999	13th of July: *Star of India* sails offshore with 13 tall ships from around the world as host vessel of the Festival of Sail
1999	7th, 8th, 12th of August: *Star of India* sails.
2000	9th of July; 14th, 15th of October: *Star of India* sails.
2001	13th, 14th of October: *Star of India* sails.
2002	12th of September, 5th, 6th of October: *Star of India* sails.
2003	15th, 16th of November: *Star of India* sails.
2004	13th, 14th of November: *Star of India* sails
2005	12th, 13th of November: *Star of India* sails.
2006	11th, 12th of November: *Star of India* sails.
2007	10th, 11th of November: *Star of India* sails.
2011	13th of November: *Star of India* sails.
2013	9th,10th, 11th of November: *Star of India* sails.

Star of India Specifications

Hull length	205 feet on the waterline, 212 feet on deck, 278 feet sparred length
Jib boom	55 feet
Beam	35 feet
Depth of hold	23 feet 6 inches
Draft	14 feet 9 inches (in ballast)
Tonnage	1197 net (British), 1247 net (U.S.)
Mainmast height	124 feet 8 inches from deck to truck
Main yard length	72 feet from the tips of the yardarms
Number of sails	20
Sail area	~19,000 square feet (material is "Duradon" and "Oceanus")
Running rigging	4.5 miles
Standing rigging	3.5 miles
Number of blocks	100+
Ballast	600 tons of poured concrete and moveable concrete blocks
Fresh water	6,000 gallons
Lines	Synthetic (Dacron, nylon, polypropylene)

Basic Terminology and Structural Description

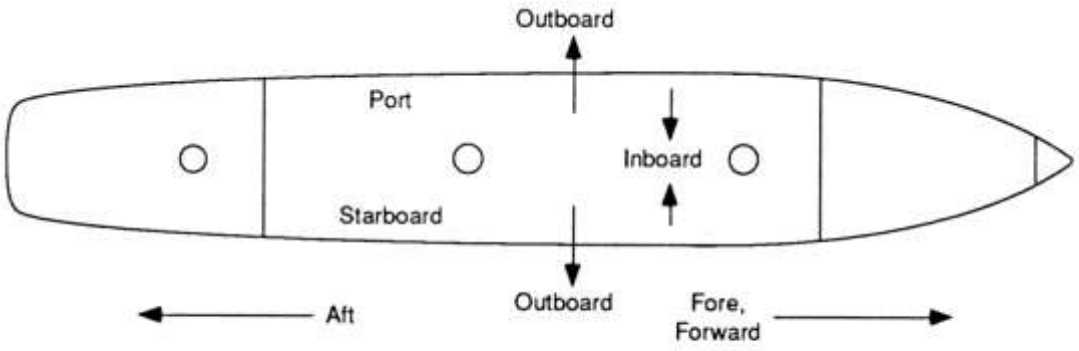
Introduction

Like all specialized occupations, that of the sailor has its own vocabulary. Many of the sailor's words and phrases have passed into common usage, enriching our everyday speech. This section presents a few key terms to help orient you to the ship, its parts and its workings. This is by no means a complete listing of square-rigger terminology, nor is it even a complete introduction. Many basics are intentionally omitted in the interest of making this material presentable and comprehensible as part of an abbreviated introduction of terms, skills, and knowledge related to the *Star of India*. Many of the terms are presented in the context of describing the basic structure and parts of a square-rigged sailing vessel.

Orientation

Figure 1 provides general directions aboard ship. Toward the front of the ship is fore or forward; toward the back is aft. If you are facing forward, port is on your left, and starboard on your right. Toward the centerline of the ship is inboard; away from the centerline is outboard. On the centerline is amidships.

These terms help identify various parts of the ship and it's rigging. For example, you can now guess that an outboard buntline is farther away from the centerline of the ship than an inboard buntline, even if you don't know what a buntline is.



Getting oriented: Top View of the *Star of India*

Figure 1. Basic Directions Aboard Ship

Anywhere on the ship closer to the keel than you are is below (never "downstairs"). Anyone or anything above the ship's hull is aloft. Note that it is redundant to say "port side," or "down below." "Port" and "below" suffice.

Since the wind supplies all the motive power for the *Star of India*, its direction relative to the ship is quite important. Any time that the wind is blowing, the direction from which it is blowing is called windward. The side of the ship facing that direction is the windward or weather side. The direction away from the wind is called leeward. The side of the ship facing that direction is the leeward or lee side.

Always be aware that for a sailing ship, the wind is the primary quality of existence. The world is divided into two hemispheres – to windward and to leeward, and most references to direction in commands use these terms as reference. More importantly, when climbing aloft, always use the weather shrouds. If you should slip, the wind will tend to blow you back onto the rigging, rather than overboard into the water.

The Hull

The system of iron framework and plates that makes up the "body" of the *Star of India* is called her hull (Figure 2). The hull forms what is essentially a watertight box that displaces enough seawater to support itself, the ship's superstructure, and its cargo. The *Star of India*'s hull is built completely of hand-wrought and riveted iron, and has survived essentially unchanged since it was built in 1863.

Parts of the Hull

The forward (pointy) end of the hull is called the bow, and the aft (other) end is called the stern.

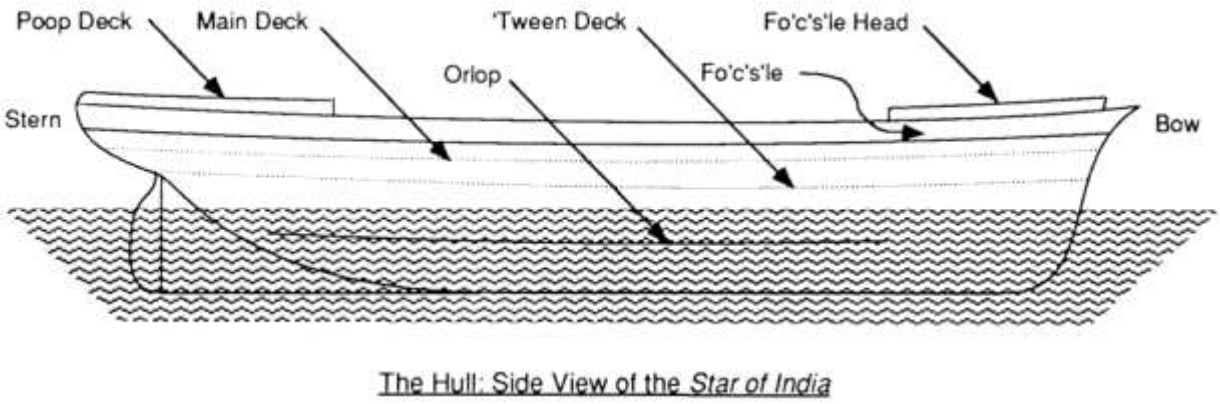


Figure 2. Elevation View of the *Star of India* Showing Different Deck Levels

There are two decks that run the entire length of the hull. The main deck forms the lid of the box that is the hull. Below it is the 'tweendeck. From the main deck, access to the 'tweendeck is gained via a companionway just forward of the saloon. Another deck called the orlop (not part of the original construction) runs a portion of the ship's length below the 'tweendeck.

At the forward end of the main deck is an enclosed section called the forecastle, or fo'c's'le. The deck that encloses the fo'c's'le is called the fo'c's'le head. At the aft end of the main deck is an enclosed section called the saloon. The deck that encloses the saloon is called the poop deck.

Other "Landmarks" On Deck

On the main deck, the sides of the hull form raised bulwarks. The bulwarks help to keep seas from washing over the deck in heavy weather, and to keep sailors from washing into the sea in the same conditions.

Aft of the foremast on the main deck is another raised structure called the deckhouse. Aft of the deckhouse, forward of the mainmast is the main hatch, which opens into the interior of the hull, called the hold.

There are two capstans on the *Star of India* (Figure 3). One, on the fo'c's'le head, operates the anchor windlass located in the fo'c's'le itself. The other capstan is located on the main deck just aft of the mainmast.

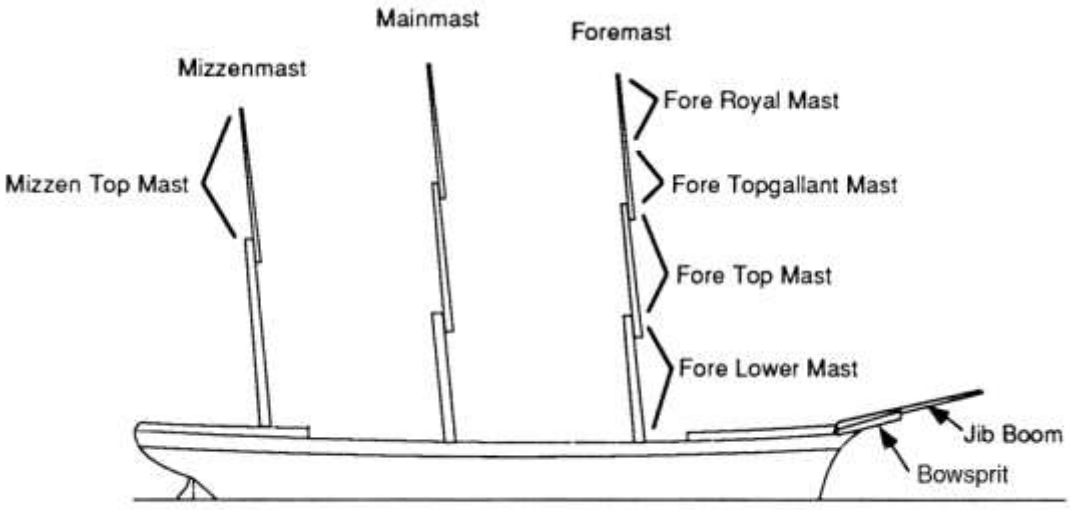
Capstan

Figure 3. Typical Capstan

Spars

Spars refer collectively to all the large structural timbers that are part of the ship's superstructure. Most apparent among the spars are the masts and yards.

The *Star of India* has three masts (Figure 4). From fore to aft they are the foremast, mainmast, and mizzenmast. The fore and main masts consist of a lower section built of iron, and two upper wooden sections. Each mast is divided functionally into four sections: lower, top, topgallant, and royal. The *Star of India*'s mizzenmast consists of two wooden sections: a lower and top.



The *Star of India's* Masts

Figure 4. The *Star of India's* Masts

Almost all the ship's rigging takes its name from the mast with which it is associated. Combined with the general nomenclature presented in the first sections, you should be able to figure out approximately where just about any item named must be. To extend the example started above, the fore topgallant port outboard buntline must be somewhere on the fore mast, up pretty high, out to the left away from the centerline. The main royal starboard sheet must be on the right side of the ship, somewhere near the top of the main mast, etc.

There are two spars at the bow of the ship: the bowsprit and the jib boom. These spars serve to carry the stays that support the foremast. On the *Star of India*, the bowsprit is made of iron, and the jib boom of wood. The bowsprit supports the longer jib boom.

Next to the masts, the largest spars aboard the *Star of India* are the yards. The yards are arranged perpendicularly to the masts, and carry the ship's square sails. It is the presence of the yards and their associated sails that makes the *Star of India* a square-rigged ship, or a square-rigger.

The *Star of India* carries yards on her fore and main masts only. This makes her a bark (or barque), rather than a true "full-rigged ship," (as she was originally built) which would also carry yards on all additional masts.

The yards, like most of the parts of the rig, are named for the mast that supports them (Figure 5). The lower mast supports the lower yard; the topmast supports the top yards; the topgallant mast supports the topgallant yard; and the royal mast supports the royal yard. The top yards, both fore and main, are unique in that they are double yards, so we have upper and lower top yards on both the fore and main masts.

This gets a little confusing since we have (starting from the bottom): a lower yard, a lower top yard, and an upper top yard. We refer to the lower fore and main yards as simply the fore yard and main yard, respectively.

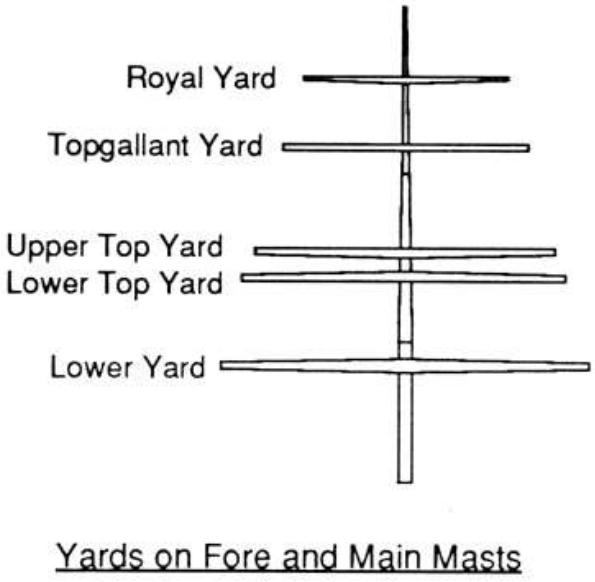


Figure 5. Yards on the Fore and Main Masts

Basic Rigging

Rigging generally refers to the entire collection of spars, lines, and gear that make up part of the ship's superstructure. Rigging falls into two general classes: standing and running.

Standing rigging consists of stationary lines, most made of wire rope of various sizes, which support the masts and jib boom. Almost all the standing rigging aboard the *Star of India* is easily identified, since it is coated with a black tar-like compound called "Netset."

Running rigging consists of all the lines that move in order to control the yards and sails. Running rigging on the *Star of India* is made of unpainted synthetic line, small-diameter wire rope, and chain.

As a novice, the distinction between standing and running rigging is important for one primary reason. When working aloft, only depend on standing rigging for hand and footholds. When someone on deck decides to yank on a piece of running rigging, you don't want to be standing on it!

Standing Rigging

Rather than attempt a comprehensive listing of all the standing rigging, we'll focus here on three pieces of standing rigging you're likely to encounter: stays, shrouds, and footropes.

The stays' job is to support the masts fore and aft. From the top of each mast, one or more stays lead forward to some secure point. Some stays, as a secondary function, carry triangular sails called "staysails," or stays'ls.

Shrouds support the masts athwartships. Several lower shrouds lead from the top of each lower mast to the bulwarks on each side of the ship. On the *Star of India*, the shrouds are tensioned with deadeyes and lanyards.

Upper shrouds run from the top of the upper masts (hounds) to the top, which is the small platform at the base of each topmast. The upper shrouds are supported at the edge of the tops by futtock shrouds tucked underneath the top, attached to the mast.

The shrouds carry ratlines and battens as a secondary function. Together, they form the "ladders" the crew uses to lay aloft (go up).

For the novice, all these terms are important because using them, we can now describe how one gets from the deck to the top. First, hoist yourself up onto the weather bulwark by grabbing onto the lanyard at the base of a shroud. Work your way to the outboard side of the shrouds. Climb up the shrouds, using ratlines for footholds, and the shrouds themselves for handholds. Upon reaching the futtock shrouds, continue climbing, holding onto the futtock shrouds—hold on tight! Reach up around the edge of the top, and grab the bottom of one of the topmast shrouds, first with one hand then the other. Now use the futtock shroud ratlines as footholds to climb around and over the top.

Each yard is equipped with footropes that hang about three feet below the aft side of the yard. Footropes, as the name suggests, are there to provide a place for sailors' feet when working on a yard. The bowsprit and jib boom are also equipped with footropes. To move along a footrope, it's generally best to slide your feet along sideways, maintaining contact with the footrope. When stepping onto a footrope let your shipmates already on the footrope know by calling out "Stepping on (port, starboard!)" so they won't be caught by surprise when the footrope moves upward. Likewise, call out "Stepping off (port, starboard!)" when stepping off the footrope to alert your shipmates to the pending downward movement.

Each crewmember laying aloft or laying out **must** wear a safety harness. **There are no exceptions to this rule, and violations will result in disciplinary action up to and including dismissal from sail training classes.** The Safety Harness consists of a commercial rock climbing harness with a single

lanyard attached to a locking carabiner. The harness is to be worn with the upper belt fastened over the top of the hips. The crewmember is taught the appropriate knot to attach the lanyard to the harness and to attach the carabineer to the lanyard. This method of acquiring a harness provides general practice in working with lines and tying knots and helps ensure close attention is paid to proper harness construction, since the crewmember is responsible for creating his/her own safety line.

Running Rigging

Becoming familiar with the running rigging is called "learning the ropes". However, the various pieces of running rigging are not properly called ropes; they are lines. (Rope is the material from which they are made.)

On the *Star of India*, the running rigging is worked from on deck. From the deck, various lines lead aloft through combinations of blocks and fairleads, to eventually connect to the piece of gear they control.

Like the muscles of the human body, running rigging comes in pairs that work in opposition. This is important to remember. Before you'll be able to haul away on a line, you will almost certainly have arranged for some other line to be eased or cast off. Failure to do so will result in excess sweat (at best) or damage to the ship and injury to the crew (at worst).

Arrangement of Running Rigging on Deck

Along the top of the bulwarks, on both sides of the main deck, runs a pin rail (there is also a pin rail surrounding the poop deck). Holes in the pin rail accommodate belaying pins to which the various pieces of running rigging can be belayed or made fast. At the base of both the fore and main masts there are fife rails that also accept belaying pins for the same purpose. Near the base of all three masts, on the masts themselves, are spider bands to which are attached cleats, again to provide places to belay running rigging. On the fo'c's'le head is the dog rail to which the headsail and fore topmast staysail downhauls are belayed. On the poop deck are brace benches to which main-mast braces are belayed.

There are a few general rules that govern the arrangement of the lines on the pin and fife rails. First, moving aft on a rail corresponds to moving higher on the mast. Thus (generally), the gear associated with the royal yard and sail will be located aft of the gear associated with the lower yards and sails. Second, many of the lines that control yards and sails come in pairs, port and starboard. In these cases, the locations along a rail on one side of the ship are mirrored on the other. Thus, if a topgallant clewline is belayed to a certain pin on the starboard rail, its mate (the port topgallant clewline) will belay to the corresponding pin on the port side. Finally, there are some lines that do not come in pairs. There is only one halyard per yard for example. These lines alternate sides: if the upper top halyard belays on the starboard side, then the halyard for the next yard up will belay on the port side, slightly aft.

The remainder of this section introduces four pieces of running rigging. These comprise the main controlling lines for the yards and square sails. The running rigging is deployed in two kinds of operation: setting and taking in sail, and adjusting the trim of the sails in response to changes in the winds direction, or the ship's course, or in the process of a maneuver. Keep in mind that, in addition to supplying propulsive power, the set and trim of sails (especially those at the ends of the ship) also affect steering and assist in performing maneuvers.

Lines that Control Yards

You may note that the three upper yards of each mast move up and down as their sails are set and taken in, while the lower yards remain fixed. This system was developed and refined over the course of four centuries and is designed to minimize the manpower necessary to handle the large forces involved and to keep the enormous weight of yards and gear as close to the ships center of gravity as possible. On both the fore and main masts, the upper three yards (upper top, topgallant, and royal) must be hoisted in order to set their sails. The line that hoists a yard is called a halyard, and there is one for each of these yards. These halyards are among the heaviest pieces of running rigging aboard the ship since they need to lift the entire weight of a yard and its sail, which may be as much as two tons. For the same reason, they are rigged to provide a large mechanical advantage.

All the yards swing from side to side on a pivot at the mast. This motion allows the square sails to be set at an angle to the ship in order to take best advantage of the wind direction (see Basic Sailing section). The lines that control this side-to-side motion are called braces. Each yard has a pair of braces (port and starboard) that work in opposition to one another. That is, to swing the port side of the yard aft and starboard end forward, the starboard brace must be eased, and the port brace hauled. The braces for the foreyard and fore top yards (both lower and upper) lead directly to the pin rail in the waist of the ship. The braces for the fore topgallant and royal yards first lead to the main mast, then down to the pin rail aft of the mainmast.

Yards on the main mast are swung in the same manner as those on the fore, with a pair of braces for each of the five yards. All braces for the main yards are led aft to the poop deck.

Lines that Control Sails

Each yard carries a square sail. The sails are named for the yards that carry them. On both the fore and main mast there are five: a lower sail (foresail and mainsail, respectively), two topsails (lower and upper), and topgallant and royal sails. Each sail is attached to its yard along its top edge, or head. When set, the sail is pulled down to the yard below it by sheets (lines) attached to its bottom corners, or clews. The sheets (one port and one starboard) lead from the sail's clews, through blocks on the yard below, in to the mast, and then down to the fife rail at the base of the mast.

The exceptions to this are the mainsail and foresail sheets which have no yard below to sheet to, and thus lead from the clews to a through-bulwark sheave near the deck (one each on port and starboard for each sail), then up to a bitt mounted on top of the pin rail. These two sails are also the only ones to have the sheets opposed by tacks, which lead forward from the clews of each sail. The foresail tacks are belayed on the catheads on the fo'c's'le head, while the mainsail tacks are belayed on the pin rails in the waist near the foresail sheet bitts.

Each square sail has a pair of clewlines that work in opposition to the sheets to haul the lower corners of the sail to the yard above. The clewlines lead from the clews up to the sail's own yard, through blocks and into the mast, then down along the shrouds to the pin rail.

The mainsail and foresail clewlines, called clew garnets, work in opposition to both the sheets and tacks. They lead from the clews up to the sail's own yard, in to the mast, then down to pins on the fife rail.

The sheets and clewlines together work the square sails somewhat like a venetian blind: to set the sail, ease the clewlines and haul away on the sheets (pulls the foot of the sail down). To douse the sail, ease the sheets, and haul away on the clewlines (pulls the foot of the sail up, like raising a blind).

On the mainsail and foresail, the tacks must also be hauled or eased to set and douse the sails, and to swing the yards during a tack or wear. Remember that on the mainsail and foresail, tacks oppose sheets fore and aft, and both tacks and sheets oppose clew garnets when setting or dousing.

To help control bellying of the square sails as they are taken in, each also has two or four buntlines. Buntlines lead from points on the foot of the sail (inboard from the clews) up to the sail's yard, into the mast above the yard, and then down along the shrouds to the pin rail. When present, buntlines belay on the next pin aft of the associated clewlines. On the Star of India, a pair of buntlines generally shares a pin.

Leechlines are used to help spill wind from the leeches of the sail and collapse the leeches inboard during furling. Leechlines lead to the center of the leeches on the foresail and mainsail. The topgallants and royals have their leechlines and outer buntlines combined into a single bunt-leechline. The topsails do not have leechlines because the leeches are so short that the sails can be handled with the clewlines and buntlines.

The rail diagram in Figure 6 shows the pin or cleat location where each piece of running rigging on the Star of India is belayed. You should become familiar with the general location of each line, and then work on knowing to which pin each line is belayed. When learning the rig, there is no substitute for looking aloft and following the lead of the line to determine what it does. You should be able to memorize the correct belay point for every line so as not to need the brass "cheater plates" affixed near each pin as teaching aids. Periodically test yourself by walking the rails and trying to identify the lines without looking at the plates. Keep in mind that lines might sometimes be led to the wrong pins; therefore, never handle a line on assumption alone. ***When in doubt look aloft!*** Always know exactly what the line is and what it does. ***Throwing off the wrong line can be dangerous.***

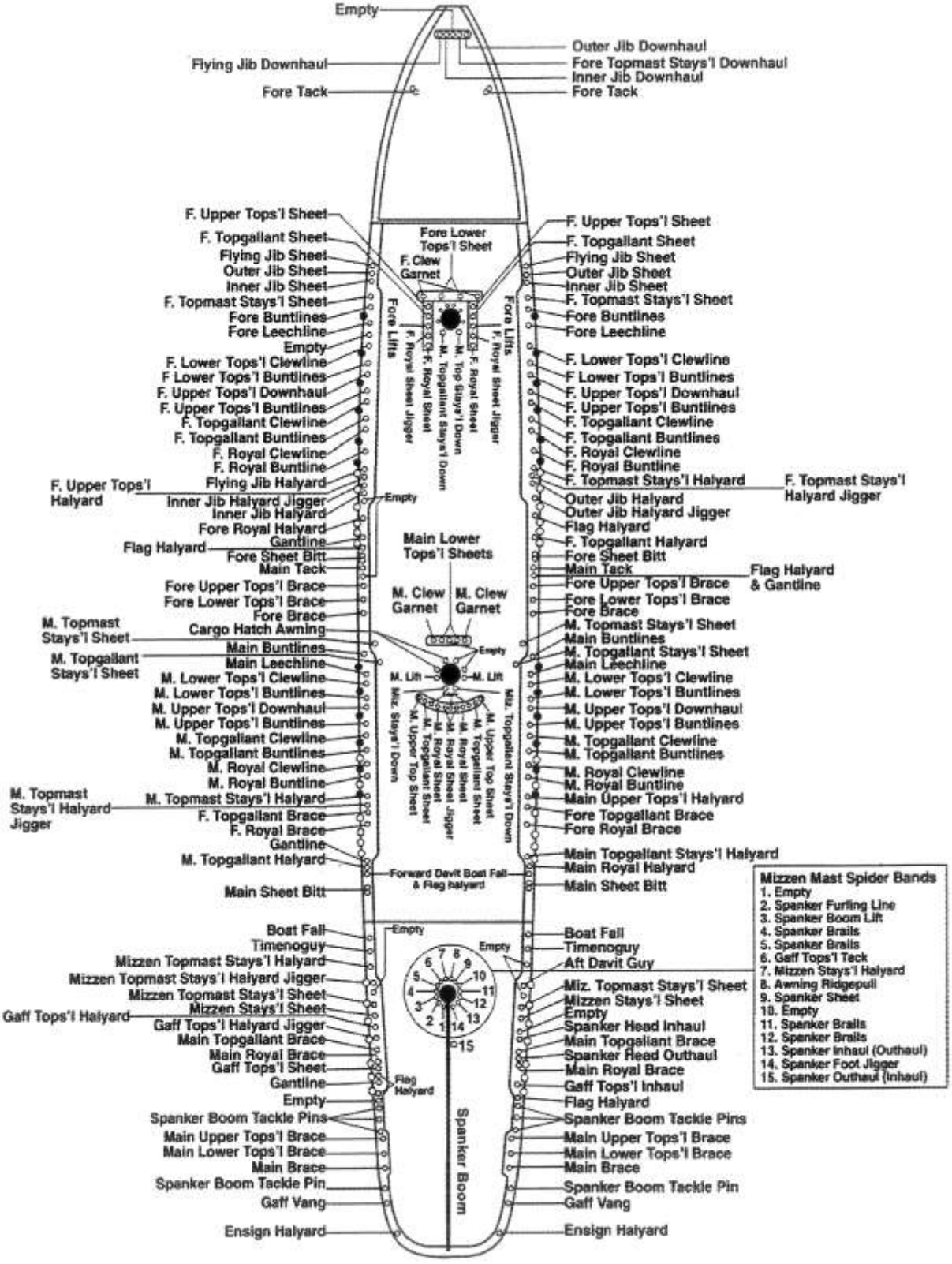


Figure 6. *Star of India* Pin Locations

Sails on the *Star of India*

The *Star of India* is a three-masted bark, meaning the fore and main masts are square-rigged, and the mizzenmast is fore-and-aft rigged. The *Star* also carries headsails and staysails, which are fore-and-aft rigged. Although technically a bark, the term "ship" will be used when referring to the *Star* in this discussion.

The sail plan of the *Star of India* is shown in Figure 7. All sails shown are set when the *Star* goes to sea. Proper operation of the ship and the safety of the crew depend upon each crewmember knowing what to do, when to do it, and why it is done. Therefore, it is imperative that you learn the name and location of the sails, the component parts of each sail using the correct terminology, and the rigging involved in handling them.

Before beginning a discussion of the sails it is important to understand that they not only drive the ship forward, but are also a means of balancing the wind forces against the bow and stern so that minimum steering input is needed to keep the ship on course. The number and type of sails used will vary with wind conditions, since this determines how much the ship will heel as well as how fast she sails. The goal is to maximize speed while avoiding excessive heel.

Square Sails – Fore and Main Masts

Square sails are carried on all yards of both the fore and main masts. The names and positions of the sails are the same on both masts, thus, when you have learned the sail configuration for one mast, it is simple to apply the names, locations, and rigging to the other mast. Refer to Figure 7 for the names and locations of the square sails.

The square sails can pivot around the mast to port or starboard, using the braces to set the best angle for the direction of the wind. When the yards are braced at right angles (90 degrees) to the centerline of the ship, the yards are braced square. This is the best set when the wind is directly behind the ship. The yards can be braced progressively around, generally in increments of one point (11.25 degrees), to accommodate changes in the wind. When the yards are braced around to approximately 45 degrees (four points) to the length of the ship they are braced sharp. This is the furthest they can be set; it is also referred to as being in the swifters because the mainsail and foresail yards touch or nearly touch the (swifter) shrouds on the leeward side of the mast

With slight variations, the components of all square sails are basically the same. Refer to the square-sail set in Figure 8 when reviewing the following parts of a square sail.

- The head is the top of the sail. It is attached to the jackstay on top of the yard with robands.

The earring is a short line attached to a cringle, or ring, in the upper corner of the sail. The earrings are used to stretch the head of the sail taut when the sail is bent onto the jackstay.

- The leech is the side of the sail.

- The clew is the lower corner of the sail. A cringle or spectacle iron is sewn into the corner to allow the sheets and clewlines to be attached.

- The foot is the bottom of the sail.

- A bolt rope is sewn into the edges of the sail to add strength and prevent fraying.

The running rigging used to set and manipulate square sails is shown using the foresail and upper topsail as examples (Figures 9 and 10, respectively). The rigging is as follows:

- Sheets are attached to the clews and are used to haul the clew down to the yard below when setting the sail. Sheets for the mainsail and foresail (the lowest sail on the main and fore masts, respectively) are led aft of the sail to the deck since there is no yard below.

- Clewlines are also attached to the clews but are used to haul the clew up to the yard on which the sail is bent when taking in the sail. Thus, clewlines oppose sheets. Clewlines on the mainsail and foresail are called clew garnets.

- Downhauls run from the upper topsail yardarm to the lower topsail yardarm. The downhauls are used to maintain control of the topsail yards during sail setting and dousing. Downhauls are found only on the upper topsails; all other sails have clewlines or clew garnets.

- Buntlines, like clewlines, are used to take in sail. They help spill the wind from the sail as the foot is brought up toward the head during furling, and make it much easier for the crew to handle the sail. It is very difficult to grab bights of sail when it is bellied out by the wind. Buntlines are lead through fairleads called lizards at the head of the sail, through bull's eyes on the forward side of the sail, and are fastened at the foot. Some sails have two sets of buntlines (inner and outer).

- Leechlines lead to the center of the leeches on the courses and are used to collapse the leeches toward the center when taking in these sails. The leechlines and outer buntlines are combined into a single bunt-leechline on the topgallants. The topsails do not have leechlines because the leeches are so short that the sail can be handled with the clewlines and buntlines.

- Tacks are only on the mainsail and foresail and are used, along with the sheets, to control the clews. Tacks are led forward of the sail to the deck and oppose the sheets which run aft, just as clewlines oppose sheets on the other yards.

- Halyards are used to raise the upper three yards on each mast when setting sail. Sails are set by sheeting home the sail, then raising the yard. This stretches the sail vertically until the proper set has been achieved. The mainsail, foresail, and both lower topsail yards are fixed and have no halyards. Setting these sails is accomplished by letting them fall, then sheeting them home.

Spanker – Mizzenmast

The spanker is the largest fore-and-aft sail and one of the largest sails on the *Star*. Since it is so large it provides tremendous thrust and, being located aft, it also acts as a huge rudder to help turn or trim the ship. On the other hand, if not properly handled it can slow the ship or prevent it from completing a maneuver. To minimize the effort required at the helm it is necessary to balance the effect of the headsails at the bow by adjusting the drive or thrust at the spanker. Refer to Figure 7 for the location of the spanker.

Figure 7 shows another sail above the spanker, called the gaff topsail. When set, this sail functions in concert with the spanker, almost as an enlargement of the sail. It allows variation in the size and, therefore, thrust of the balance and steering functions of the sails aft.

Many of the components of the spanker are similar to the square sails. Figure 11 shows the sail parts and rigging used to handle the spanker.

- The head is the top of the sail. The head is attached with slides, or cars, to a track on the underside of the gaff.

- The luff is the edge of the sail closest to the mizzenmast. It is fixed to the mast with a slide-and-track arrangement.

- The leech is the aft edge of the sail.

- The foot is the bottom of the sail. It, too, is attached with a slide-and-track arrangement to the upper side of the spanker boom.

- Each corner of the sail has a cringle to allow the sail to be set.

- The throat is located at the intersection of the head and luff, the tack at the luff and foot, the clew at the foot and leech, and the peak at the leech and head.

- A bolt rope surrounds the sail to more evenly distribute the strain at the attachment points.

The running rigging serving the spanker is also shown in Figure 11. As the gaff is standing and the sail luff is always made to the mast, setting and dousing the spanker is somewhat different than the other sails.

- The head of the spanker is controlled using the peak, or head, outhaul and inhaul.

- The foot of the sail is controlled using the foot outhaul and inhaul.

- Brails are analogous to buntlines on the square sails and, when dousing the sail, may be used to reduce the load carried by the head and foot slides. Since the wind may be on either side of the spanker there are brails on both sides of the sail.

- Vangs are used to trim or adjust the gaff.

- The sheet and boom tackle are used in opposition to each other to control the position of the boom. As there is only one boom tackle (preventer) it is shifted from side to side as appropriate while maneuvering.

- The topping lift supports the boom when the spanker is not set. It is adjustable and can be used to help manage sail shape.

The gaff topsail is similar to the staysail shown in Figure 12. The differences only are discussed below.

- The luff of the sail is vertical. The luff has three distinct sections. The upper section is freestanding. The middle section is hanked to a luff stay. The bottom of the middle section is fixed to the mizzenmast at the throat, or nock, of the sail. The bottom section is freestanding.

- The halyard hoists the upper two sections of the luff.

- The tack draws down the bottom section.

- The sheet is led to the end of the gaff.

- The downhaul serves to collapse the entire sail to the nock and is rigged to allow a doubled purchase to oppose the sheet while dousing.

Headsails and Staysails

The flying jib, outer jib, inner jib, and fore topmast staysail are the headsails on the *Star*. When set they not only provide driving power but also help balance the ship against the driving force of the spanker. Headsail sheets are led aft along the forecastle head to the pin rail. Note that despite its name, the fore topmast staysail is included with the headsails. It is set when the staysails below are set, but it is located on the jib boom with the three jibs and has both port and starboard sheets. Refer to Figure 7 for the location of the headsails. Figure 12 identifies the parts of the headsails and their associated rigging, except that the downhauls are made to the head of the sail rather than the clew as shown in the figure.

The main topmast staysail, main topgallant staysail, mizzen staysail, and mizzen topmast staysail are the other staysails set when the *Star* sails. They provide driving power as well as a stabilizing effect when in rolling seas. Unlike headsails which have a sheet for port and one for starboard as do the square sails, staysails may have only one sheet which must be moved from one side of the ship to the other during maneuvers. Refer to Figure 7 for the location of the staysails, and Figure 12 for parts of the staysails and their associated rigging.

Figure 7, *Star of India* Sail Plan

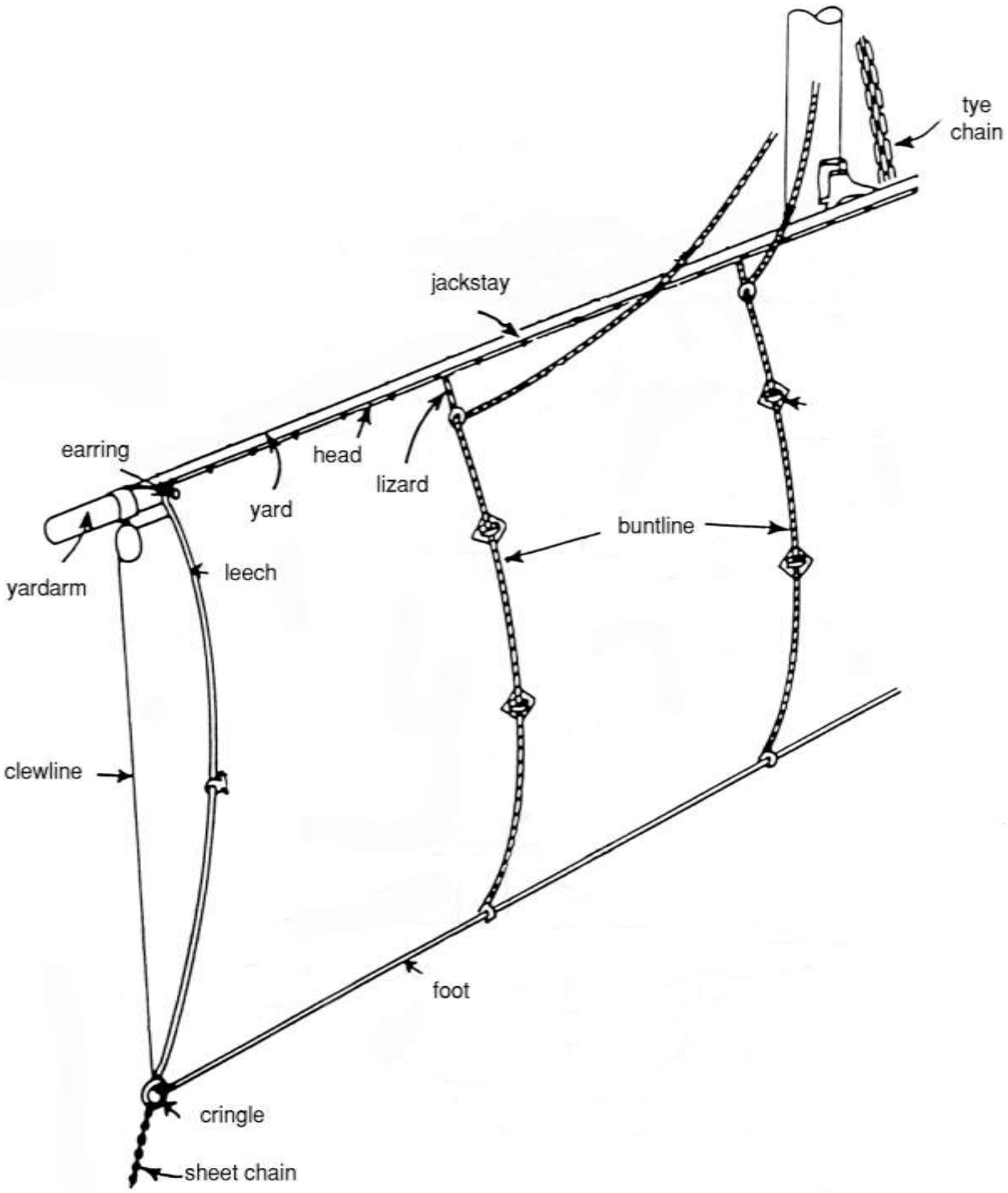


Figure 8. Generic Square Sail Set

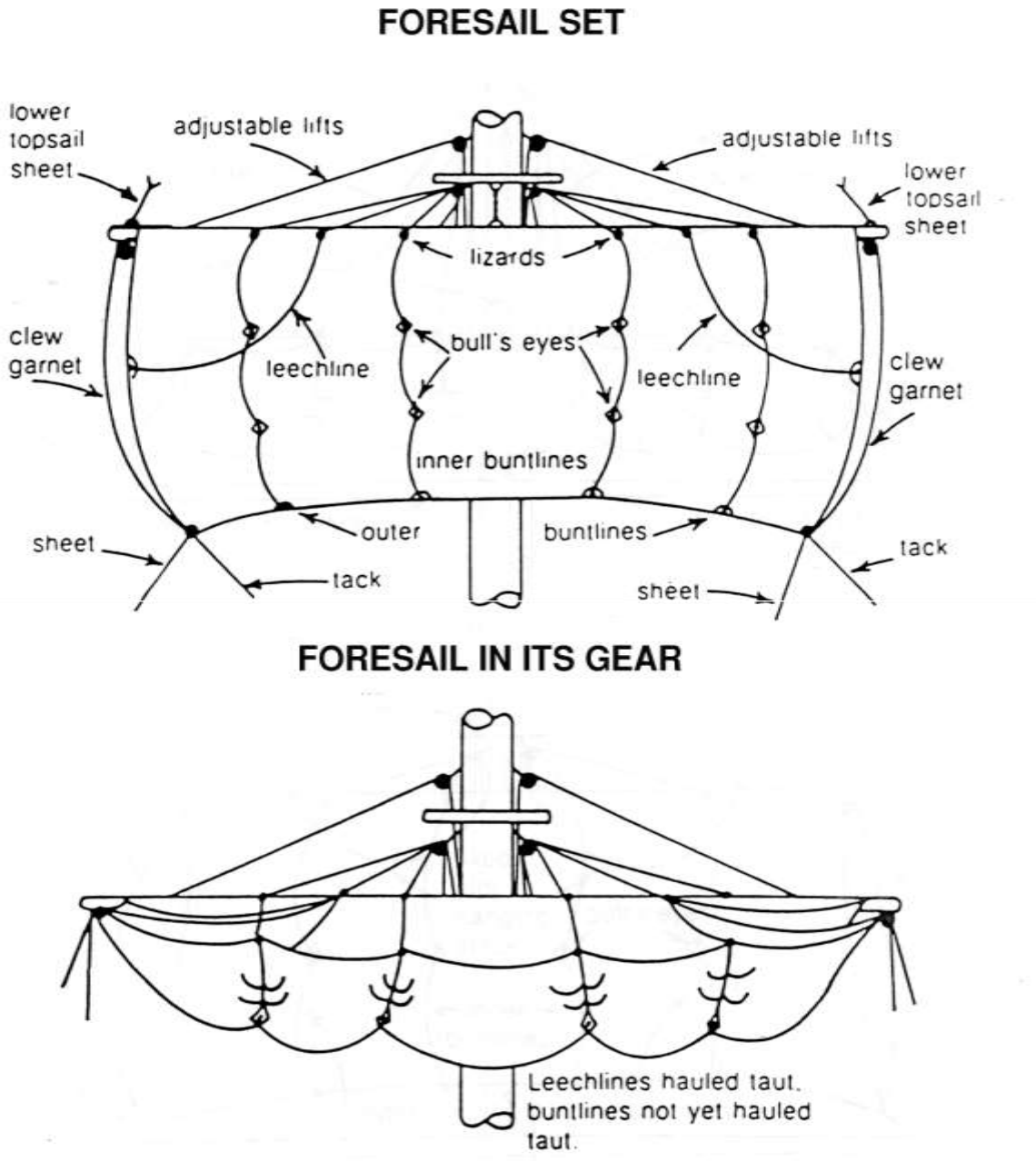


Figure 9. Foresail Set and Rigging

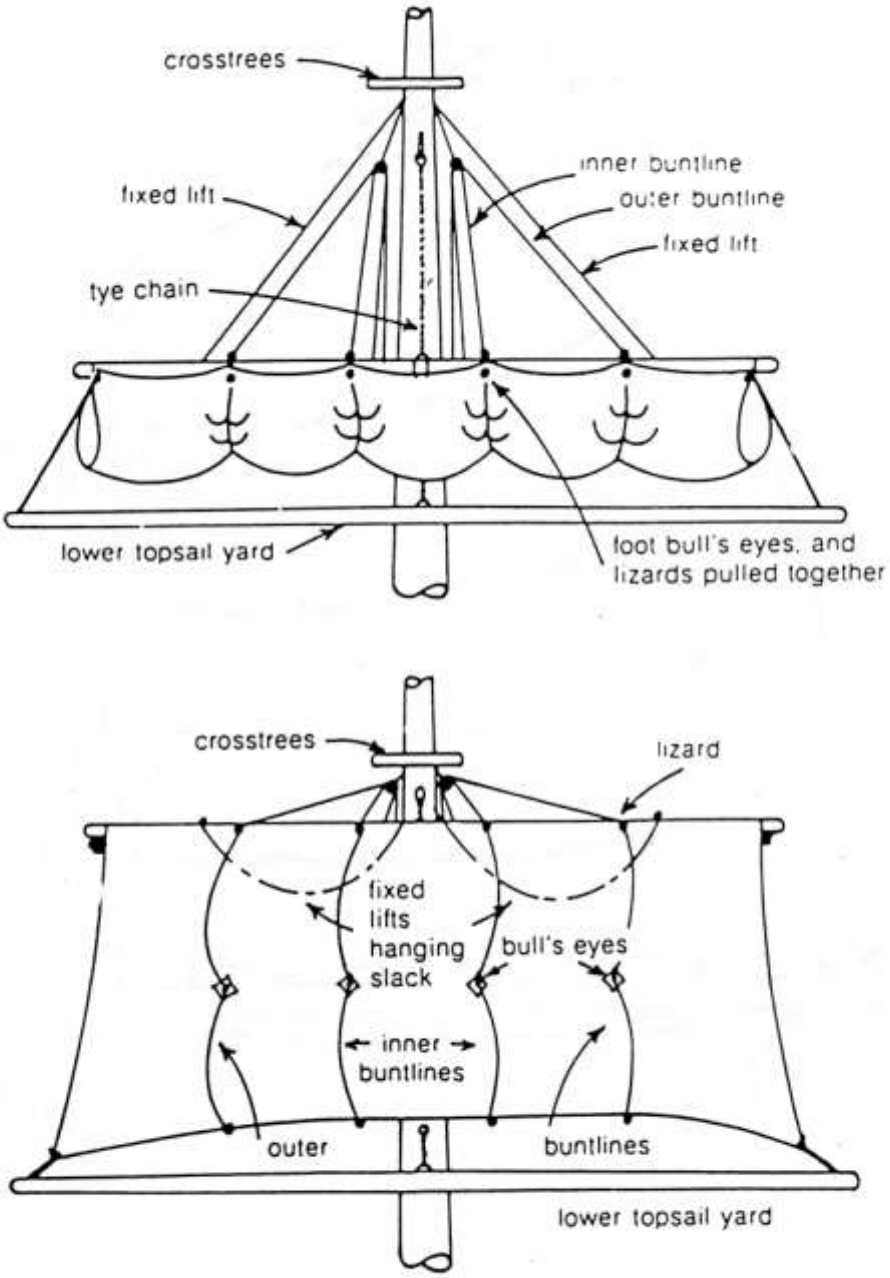


Figure 10. Upper Topsail Set and Rigging

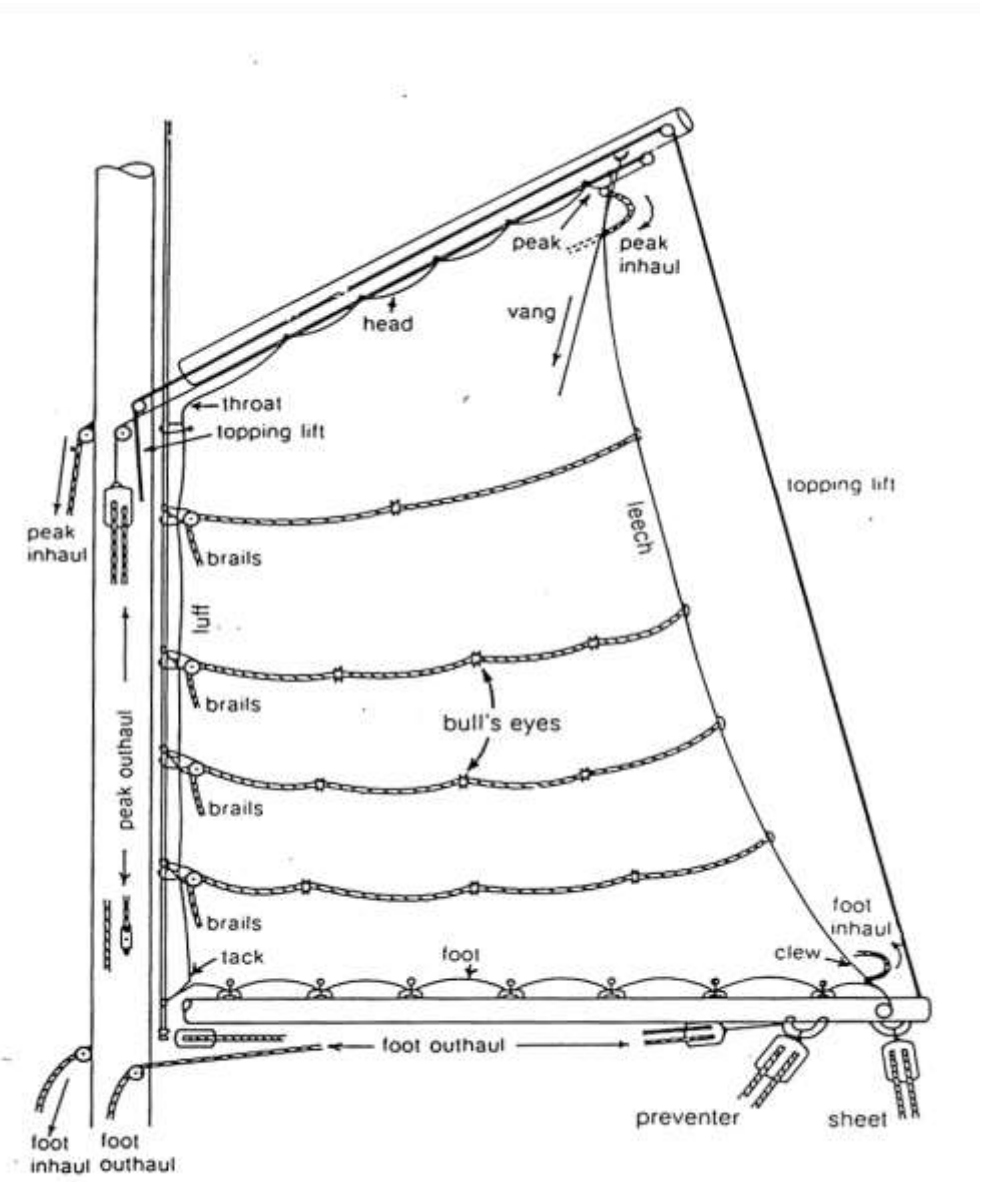


Figure 11. Spanker Set and Rigging

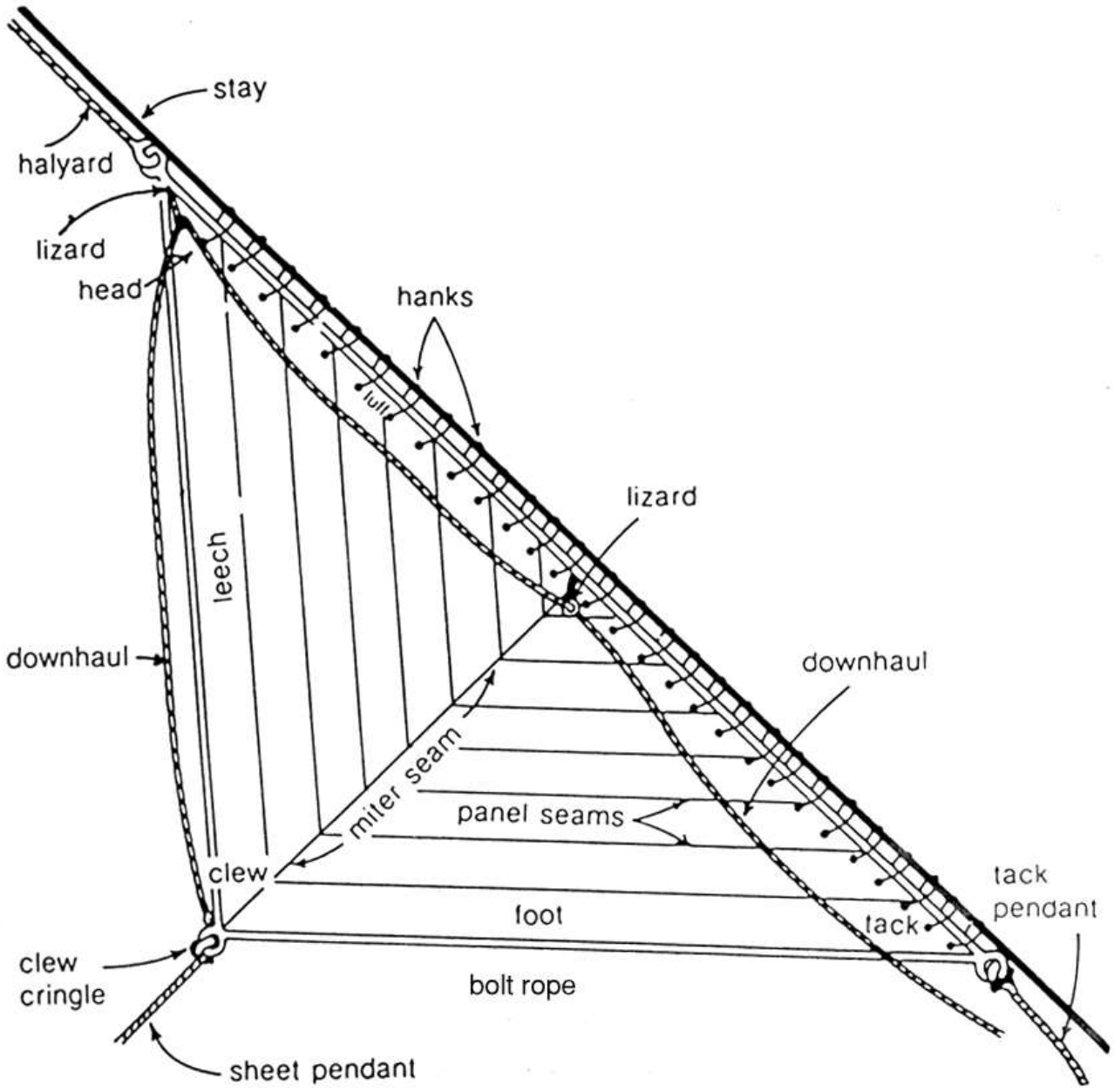


Figure 12. Staysail Set and Rigging

Hull, spars, rigging, and sails are all useless unless we can get the wind to blow the whole collection across the sea from one place to another. This section briefly describes how the square sails are used to drive the ship under the influence of the wind.

Any sailing ship always operates in one of two modes. When the wind is such that the ship can sail directly toward the objective, the course is set by the compass and the sails are adjusted (trimmed) in optimal accordance with every change in the wind's direction. When the ship cannot sail directly toward the objective (because it is too close to the eye of the wind), the sails are trimmed for sailing as close to the wind as possible and any adjustments for the changes in the wind's direction are made by course alone. Thus, ships always find themselves either sailing "by the wind" (close hauled) or "with the wind free."

In the simplest case, the wind comes from directly behind the ship when the ship is running as shown in Figure 13. Anyone who's ever held his or her jacket open on a windy day can imagine how the wind will push the ship forward.

Almost always however, the ship's destination will not lie directly downwind. Even if it does, because the sails aft blanket those forward, a dead run is so inefficient that it is preferable to progress downwind in a series of slants just high enough off the course to keep all of the sails in clear wind (sailing "by and large"). The ship can sail at an angle to the wind by setting its sails at an angle, as depicted by the broad reach in Figure 13.

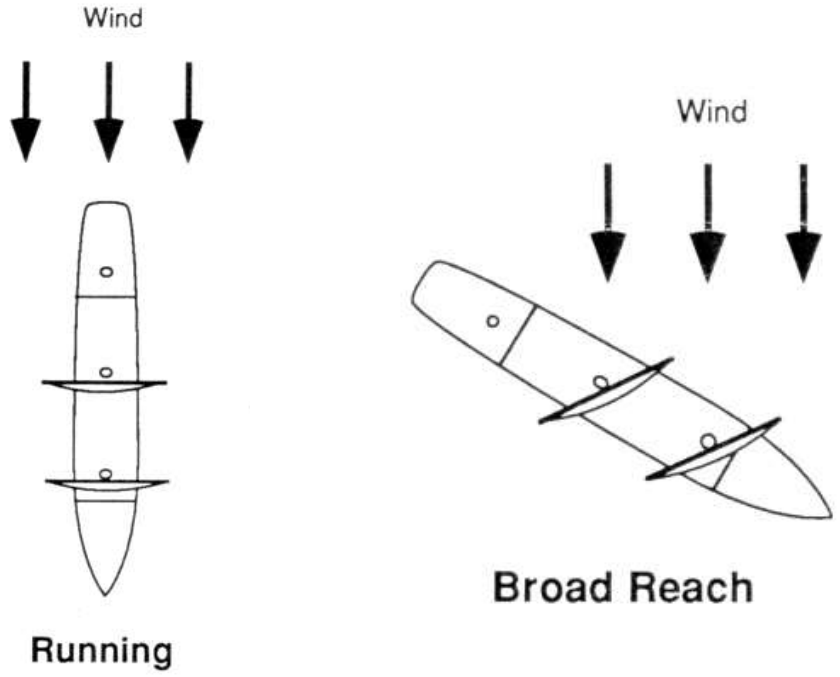


Figure 13. Ship and Sail Positions When Running and During a Broad Reach

As shown during a broad reach, the yards are swung with their port ends forward and starboard ends aft. This sets the sails at an angle in such a way that they catch the wind, driving the ship forward in the desired direction. Since the wind is coming over the ship's port side, the ship is on port tack.

Actually, a complex combination of forces acts on the ship whenever it sails: the wind pushes directly on the hull, rigging, and sails; the water offers resistance to the hull; and the curved shapes of the sails create aerodynamic lift. When the ship is on a broad reach, all these forces will combine to move the ship along a course slightly to starboard of the ship's heading and the ship is still moving partially with the wind.

What if our destination lies to windward? It turns out that by taking advantage of the aerodynamic forces created by the sails, the ship can actually sail slightly into the wind, as shown in Figure 14.

The figure shows that the yards have been swung to their extreme positions, with their port ends as far forward as possible. The complex interaction of the lift of the sails, combined with the lateral resistance of the hull in the water, allows the ship to move across and slightly into the wind. The ship shown in the figure is close-hauled on port tack.

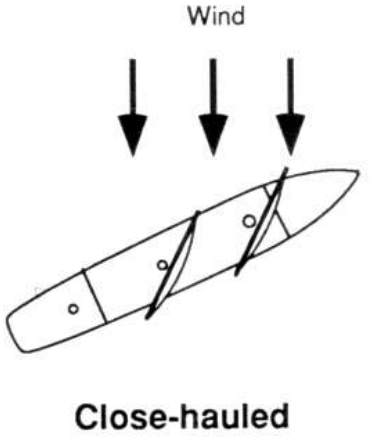


Figure 14. Ship Sailing Close-hauled – as Close As Possible Into the Wind

If the ship attempts to turn farther upwind (to port), the sails will no longer be able to fill properly and hold their curved shape; they'll begin flapping like flags in the breeze. This is called lifting, and it indicates that the ship is no longer sailing, and will soon stop unless the helmsman corrects the situation by falling off (turning slightly downwind -- to starboard in the figure above). If the ship turns even farther into the wind, it will be caught aback, with the wind pushing backwards on the forward sides of the sails. In a strong wind this is extremely dangerous, since the stays are not designed to support the masts against such a load.

To gain as much upwind distance as possible, the helmsman must steer the ship as close to the wind as possible without lifting any of the sails. This is called sailing full and by, meaning that the ship’s course is adjusted as required to the wind (rather than sailing a fixed compass course and adjusting sails to suit).

What if our destination lies directly upwind? The ship cannot head directly towards its destination without sails lifting or being caught aback, so it must sail a zigzag course, gradually approaching its destination in a round-about way, as shown in Figure 15.

The ship sails alternately on port and starboard tacks, gradually making its way upwind. Sailing this kind of course is called (appropriately) tacking. Each time the ship tacks (changes from one tack to the other), the crew has to swing all the yards from one side to the other.

Successfully tacking a square-rigged ship is no mean feat, and it is the primary maneuver for which the *Star of India*’s volunteer crew trains. During a tack, the ship turns upwind (which both lifts and

backs the square sails -- temporarily) and then falls off on her new course on the opposite tack. During this time, the mainmast yards, and then the foremast yards, are swung from one extreme position to the other. If all goes well, the sails fill on the new tack and the ship continues on her way. If all does not go well, the ship comes dead in the water (stops), and may even gain sternway (begin moving backwards) while she is head to the wind. In this event, additional maneuvering is required to straighten things out. The tacking maneuver is shown in Figure 16.

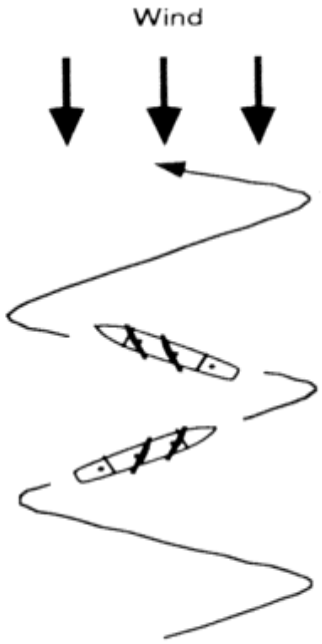


Figure 15. Ship Tacking to Make Progress Against the Wind

Figure 16. Tacking Evolution Showing Movement of Ship and Yards Relative to the Wind

A second maneuver that positions the ship on a new tack is wearing ship. This differs from tacking in that the stern of the ship comes through the wind rather than the bow. The ship falls off on the current tack and continues to turn to the opposite tack while keeping the square sails as square to the wind as possible. This maneuver is executed for several reasons. If the wind is so strong that putting the bow through the wind during a tack would stress or endanger the rig (remember that the rig is designed to take winds from aft or athwartships), or if the winds are so light that headway is insufficient to bring the bow through the wind, the command is given to wear ship.

Figure 17 illustrates the evolution of wearing ship. As you can see, the ship loses ground while wearing, but that's preferable to risking the ship by tacking in strong winds or sitting "in irons" in light winds.

Figure 17. Wearing Evolution Showing Movement of Ship and Yards Relative to the Wind

Once you understand the basics of ship movement for each of the maneuvers described above, you should read the excerpt from a 1936 square-rigger crew-training manual in Appendix B. See if you can understand and follow the terms and evolutions. If not, come back to this section and review.

Safety

Safety is always the first priority when participating in activities aboard the *Star of India*. The following paragraphs describe rules and guidelines for ensuring that each crewmember knows what is expected in terms of safety and behavior aboard ship. It is the responsibility of both "old hands" and "newbies" to understand and follow these rules and guidelines. We are all responsible not only for our own safety, but for the safety of every one of our shipmates and guests. Remember that a serious accident not only results in severe injury, but it could also mean the end of the volunteer program.

Attitude

While aboard the *Star* your attitude plays a large role in how well – and how safely – you perform tasks and participate in day-to-day maintenance and training activities. Respect the ship and your shipmates. You should follow what's going on and be concerned, careful, deliberate, and always keep in mind that the sea is the most unforgiving of environments. Accidents happen when you become too complacent and cocky.

In addition to understanding what you are doing and why, it helps to know what your shipmates are doing on that same task. If you don't know the reason or mechanics behind something, ask an instructor. It's always better to ask questions than to not ask and risk injury to yourself or your shipmates. If you are perceived as an "accident waiting to happen", your chances of making the sailing crew are very slim.

Commands

When commands are being given, be quiet, anticipate the sequence of events to follow, listen for each part of the command, and **carry it out only when directed to do so**. Changes in command sequences do occur, and if you've moved ahead and executed in advance of the order you may cause the interruption or failure of the entire evolution, in addition to putting yourself or your shipmates at risk.

Therefore, it's necessary to know what the commands mean and follow them only when ordered to do so.

Clothing

The following are general guidelines for clothing and other items you may wear or bring aboard ship. Once again, if in doubt about any of these guidelines, ask an instructor.

1. Glasses should be secured with a band or lanyard. They must be secured when laying out or going aloft. This pertains to both sunglasses and prescription glasses.

2. Gloves are recommended to help prevent rope burns, splinters, or cuts from frayed wire rope or other sharp objects. Gloves **must** be fingerless (sailing gloves, weight-lifting gloves, biking gloves, cut-off leather work gloves). **Gloves must <u>not</u> be worn aloft at any time.**

3. No shorts are permitted. Long pants are required for all maintenance and sail training sessions.

4. Shoes should have heels which are built-in, not glued-on or nailed-on (i.e., one-piece soles) although tennis shoes are permitted. All shoes should have good arch supports – after standing on a footrope for more than five minutes you'll understand why.

5. Hats are generally not recommended when going aloft or laying out. If you choose to wear a hat, it must be secured with a lanyard.

6. Keep your knife sharp, in a completely enclosed sheath (unless it's a folding knife), and on a lanyard. All tools including your knife, marlinespike, pliers, etc., which are routinely carried aboard ship must be on a lanyard. In addition, any other tools used when working above the deck must be on a lanyard.

7. It is recommended that all valuables (wallets, expensive jewelry, etc.) be left at home. If brought aboard, leave them in a sea bag. Pockets have been ripped off or blown out by running rigging, with a resulting loss of valuables from that pocket.

8. No loose clothing or jewelry. Shirts should be tucked in and jackets should be zipped or buttoned so as not to catch on rigging or get caught in a block. Oversize sweatshirts or pants should also be avoided. It's best to leave watches, rings, necklaces, etc., in a sea bag or at home. It's especially important to remove these items when going aloft so they don't catch on rigging or become accidentally "removed" and fall to the deck.

10. Long hair should be tied back securely in such a way that it can't be caught up in a line or block. Ponytails should likewise be secured to avoid becoming caught in rigging.

<u>On Deck</u>

The following guidelines apply when working on deck or moving around the ship.

1. A quiet ship is a safe ship. It's difficult to hear commands if everyone is talking. This doesn't mean you can't talk, but keep the idle chatter to a minimum during training, especially during maneuvers.

2. Keep your hands at least two feet away from blocks when hauling or easing lines. Lines can move so quickly that fingers, and a good portion of your arm, can be sucked through the block before you can react.

3. Know your knots and use the correct ones for the task at hand. Using incorrect knots can slow or halt a maneuver, endanger personnel, or simply make it difficult to undo the knot when necessary.

4. Know what you're doing before you do it, especially when manning or tending lines, and look aloft often to make sure that the results are those intended.

5. Don't step on lines, stand in bights, or straddle lines. If the line is hauled on or begins to run, you may end up being thrown to the deck, dragged along the deck, or suffer other unpleasant things. As much as possible, keep clear of the direction of load for any line under strain, especially towlines. Picture in your mind what would happen if a line parted or a piece of gear under strain gave way.

6. Move forward on starboard and aft on port. Following the same logic, go up ladders to your right and down on your right. That is, movement should always be counter-clockwise. Get in the habit of doing this at all times when aboard, even during idle times, and you won't be running into shipmates when called to stations.

7. Lend a hand. Make certain there are enough hands to do the job if you're in charge, and pitch in if it's appropriate to do so when you're not. Don't stand by and watch someone struggle if you are available – ask if you can help. Remember that crewing is a team activity.

8. Don't take a line off a pin unless you know what its function is, and are ordered to do so. Keep one turn on the pin or bollard when easing any line under strain. Throwing off a brace or halyard at the wrong time can cause great harm to crewmembers and rigging. If in doubt, ask an instructor.

9. Never haul away on a line unless ordered. Doing so can be dangerous to your shipmates and the ship.

10. If you meet with unusual resistance when hauling a line, look aloft to see if the line is fouled or if you are hauling on the correct line.

11. **Never adjust the braces when the yards are manned.**

Rules for Climbing and Working Aloft

Because climbing entails significant risk, the rules for doing so are described in this separate section. Although most of the work of running the ship is done from the deck and the consequences of a mistake can be severe (throwing off a halyard, loosening a brace with people on the yard), the consequences of a mistake aloft can be significantly higher. This makes the rules for climbing and working aloft particularly crucial and they **must** be followed.

1. **Never climb without authorization from the Captain, mast captain, or instructor, and always use a harness**.

2. Never attempt any climbing or other activity aloft if you don't feel comfortable doing it or feel ill.

3. Don't wear loose clothing, jewelry, watches, or gloves aloft. All loose items (knives, hats, glasses, spikes, tools) must have a lanyard attached. Long hair and ponytails should be tied back securely in such a way that they can't be caught up in a line or block.

4. Never climb alone unless you have full knowledge of the rigging and have visually and physically checked out the lines, etc., in the area you are going to work.

5. Don't take unnecessary chances, plan your movements aloft in advance, and avoid grandstanding.

6. When you arrive at your work location you must clip your harness on to the jackstay or other appropriate standing rigging. If you aren't sure what's appropriate, ask an instructor immediately, and then clip on as directed.

7. One hand for the ship and one for yourself. This does not apply when furling since it's not possible to furl properly with one hand. However, generally speaking, you should keep three points of contact with standing rigging or other non-moving structures.

8. Use only standing rigging for support (standing rigging is usually tarred and therefore black). Never use running rigging, e.g., clewlines, buntlines, or other gear that may come slack. The exception is if you must grab something to keep from loosing your balance and possibly falling - grab the closest thing whether it's standing or running.

9. Ratlines are light and sometimes carry away. Consequently, when going aloft always keep your hands on the shrouds and use the ratlines only for your feet. Climb one ratline at a time, stepping as close to the shrouds as possible.

10. When laying out on the yards always hold on to the jackstay. Never trust your life to gaskets or bights of sail.

11. When stepping on or off a footrope you must let your shipmates on that footrope know in advance. Your weight coming on to or leaving the footrope will cause it to raise or lower and could throw them off. Before you step on or off, ask for permission by calling out "Stepping on port/starboard" or "Stepping off port/starboard". Wait for acknowledgement before proceeding.

12. Never stand on a yard. Use the Flemish horses on the yardarms.

13. Never get on the lee side of a sail. Always remember that a very small puff of wind in a sail is quite capable of throwing you entirely out of the rigging or knocking your feet off the footropes.

14. Always use the weather shrouds for climbing.

15. Keep talk to a minimum when working aloft so commands can be heard. The yard captain should be the only person giving commands or communicating with personnel on the deck.

16. Remember that going aloft places you somewhat out of touch from the deck. Unless specifically authorized, complete the assigned task in the rig and then report back to the deck. Don't tarry aloft taking in the view.

16. If at any time you see anything that appears unsafe, **REPORT IT AT ONCE**. This includes loose or broken rigging, unsafe methods of performing a task, or a shipmate's actions. **BE ALERT!! THINK SAFETY!! ACT SAFELY!!**

17. Once again, remember we are all responsible not only for our own safety, but for the safety of every one of our shipmates and guests. **Violation of any of the above rules will result in disciplinary action up to and including dismissal from the sail training classes.**

Chain of Command

Merchant ships such as the *Star of India*, like all ships, employed a chain of command to ensure the efficient operation of the ship. We maintain this tradition today. The chain of command must be understood before reading the following sections describing the actions involved in sailing the *Star*.

The Captain is at the top of the chain of command. He is ultimately responsible for the operation and safety of the ship, its crew, guests, and cargo. His word is law. He decides where to sail the ship, what sails to set or douse, and when to alter course. He gives his orders directly to the First Mate and mast captains.

The next crewmember below the Captain in the chain of command is the First Mate. The mate has responsibility for the safe operation of the crew and the efficient operation of the ship, with special attention to the rig. The mate gives orders directly to the mast captains and the crew.

Each mast has an assigned mast captain. The three mast captains are next in line under the mate. The mast captains are responsible for the safety of their assigned crews, other crewmembers who may be working on or near their masts, and the efficient operation of their masts. No one climbs any mast or the jib boom, or throws off or adjusts any line associated with a particular mast without permission from the appropriate mast captain.

The mast captains are assisted by pin rail and fife rail supervisors, who are responsible for all the lines and crewmembers assigned to their specific rails. The supervisors take orders from the mast captains, and direct and assist their crews in carrying out these orders. Other supervisors may be assigned to the yards during furling, or other specific tasks. They are responsible for specific crewmembers, parts of the rig, or other work.

Next, and last, comes the crew. As crewmembers your job is to pay attention to all persons above you in the chain and to carry out orders when directed. You are expected to work quietly and efficiently. It is important to stay alert and anticipate when and what orders will come next. However, successfully anticipating a command does not mean that you start throwing of and faking lines, for example. Rather, it means that you are aware of where your next work station will be and what you will be doing.

It is also your responsibility to look for any potential problems that may prevent you from completing the anticipated task. Notify the next person above you in the chain of command if you see a potential problem. However, if the ship, crew, or guests are in danger, report it immediately to the first person who is part of the chain regardless of their level.

Setting Sail – The Captain's Perspective

The *Star of India*'s Captain, Rich Goben, wrote the following description of setting sail aboard the *Star*. This "Captain's perspective" is interesting to read, but it's also instructional from the standpoint of being more than just a cut-and-dried set of commands. It describes what Captain Goben looks for in terms of ship movement, wind conditions, sail behavior, etc., which guide his decisions on what commands to give, and when.

Just as in maneuvering, the key to setting sail is to control the total balance of pressures affecting the ship.

Each vessel has a particular pivot point somewhere in the length of the hull. This is normally called the "center of lateral resistance". If pressure is applied forward of this point, the ship's head tends to turn with the pressure. If pressure is applied aft of this point, the stern tends to follow the direction of push. The center of lateral resistance is where any pressure on the hull from the side does not affect the ship's course.

As sails are set and filled, they apply wind pressure at right angles to the hull. Depending on where each sail is located, it will provide force at a point on the hull that is below it. This is called the "center of effort", and is the combined force of all sails set, even if there is only one. In other words, a sail set forward will try to push the bow downwind, and a sail set aft will push on the stern, resulting in the bow pointing more towards the wind.

Since the *Star of India* has no motor and must therefore be towed out of the harbor, most of the sail setting is done while under tow. After the sails are set and the *Star* is moving under her own power, the tow is dropped.

The first command to set sails is **"Lay Aloft and Loose All Sail"**. At this point, all crew qualified to work aloft will go up and loosen all gaskets, then roll each square sail forward off of the yard. The sails will hang, supported by buntlines and clewlines. A sail in this state is said to be "in its gear". The fore-and-aft sails will also be loosened and made ready for setting at this time. When all sails are ready, the mast captains report this status to the Captain.

The next command will be **"Stand By to Set Sail"**. Again, the mast captains report when their masts are manned and ready.

Keeping overall ship balance in mind, sail setting normally starts low and in the middle of the ship. The main topmast staysail, fore topmast staysail, and mizzen staysail are set simultaneously. Although the Captain gives the overall commands to set specific sails, the mast captains give the individual commands for their masts.

The spanker is usually set next, and to balance that, the headsails (inner jib and outer jib) are set as well. If the gaff topsail is set at this time, the flying jib is set for balance. At this point, the mizzen topmast staysail and main topgallant staysail may also be set.

When all desired fore-and-aft sails are set and drawing, the square sails are set. There is less wear and tear on the rig if the square sails are set with all yards braced square, so it may be necessary to square up the yards at this point. The commands **"Stand By the Braces"**, then **"Brace Square"** may be used. The mainmast captain gives commands to both the mainmast and foremast crews at this time.

Once the command is given to set square sails, the mainmast and foremast captains call the individual sail sets. The goal is to have the mainmast and foremast work in unison so that the sails go up on both masts together, yard for yard.

For the sake of balance and handling, the lower topsails are set first. The upper topsails are next, followed by the topgallants, then the royals. Due to visibility and handling considerations, the foresail and mainsail are set after all other square sails.

Dousing sail is usually done in the opposite order from this. However, during special maneuvers the order is subject to change.

By following the order of setting sails described above, the balance of the ship is under control no matter how many of the sails are set at any given time.

Setting Sail Commands and Actions

In the previous section, Captain Goben provided a general description of the mechanics of setting the *Star of India*'s sails. The following gives a concise summary of the sequence of sail-setting commands given by the Captain and mast captains, and the resulting crew actions.

Commands

Captain	Mast Captain	Actions
Lay aloft and loose all sail		
	(Main) **Upper crew lay aloft and loose all sail**	Upper crew lays to royal and topgallant yards, loosens gaskets, makes up gaskets, and puts sails into their gear (crew times "let fall" to coincide with "let fall" on the foremast) Part of the lower crew lays to upper topsail yard, then to lower topsail yards, rest climb to mainsail yard, loosen gaskets, make up gaskets, and put sails into their gear (time "let fall" with fore crew)
	(Fore) **Lay out, lay aloft, and loose all sail**	Upper crew lays to royal and topgallant yards, loosens gaskets, makes up gaskets, and puts sails into their gear (crew times "let fall" to coincide with "let fall" on the mainmast) Part of the lower crew lays to upper topsail yard, then to lower topsail yard, rest climb to mainsail yard, loosen gaskets, make up gaskets, and put sails into their gear (time "let fall" with main crew) Forecastle-head crew lays out on the jib boom, loosens gaskets, makes up gaskets, pushes sails off of jib boom to leeward
	(Mizzen) **Lay aloft and loose all sail**	Lay to the crane-lines, release spanker furling line from hooks on mast, and make up furling line Loosen and make up the gaskets on the gaff topsail

Commands

Captain	**Mast Captain**	**Actions**
Stand by to set sails		
		Fake out the staysail downhauls Run out the staysail sheets Man the staysail halyards and jiggers
Set the staysails	(Fore and main) **Ease the downhauls** **Haul away on the halyards** **Tend the sheets**	
		Ease the downhauls Haul away on the halyards Tend the sheets Set the halyard jiggers
Set the headsails	(Fore) **Ease the downhauls** **Haul away on the halyards** **Tend the sheets**	
		Ease the downhauls Haul away on the halyards Tend the sheets Set the halyard jiggers
Set the spanker	(Mizzen) **Lead out the boom tackle To port (starboard) beam**	
		Attach the boom tackle to the lee pendant
	Man the boom topping lift	
		Top up the boom
	Man the spanker gear	
		Crew goes to their first stations for setting the spanker
	Throw off the brails Throw off the spanker head inhaul	
		Throw off the brails and spanker head inhaul and ensure they are clear to run

Commands

Captain	Mast Captain	Actions
	Haul away on the spanker head outhaul **Tend the spanker foot inhaul**	Haul away on the spanker head outhaul Make sure the spanker foot inhaul runs freely
	Man the spanker foot outhaul **Haul on the spanker foot outhaul**	Haul away on the spanker foot outhaul, making sure the foot does not set ahead of the head
Stand by to set squares	(Fore and main) **Lay down the gear**	Lay down the coils for buntlines, clewlines, sheets, and bunt-leechlines Fake out the braces Top-men lay aloft
Set all squares	(Fore and main) **Man the lower topsail gear**	Crew goes to their positions for setting the lower topsail
	Ease the buntlines and clewlines	Ease the lower topsail buntlines and clewlines
	Sheet home the lower topsail	Haul away on the sheets to the marks and belay
	Man the (upper topsail, topgallant, royal gear)	Tend the braces Tend the buntlines, bunt-leechlines, clewlines (downhauls) Man the sheets Cast off the sheet for the sail above the one being set (not necessary when setting the royal) Ready the royal sheet jiggers

Commands

Captain	Mast Captain	Actions
	Sheet home the (upper topsail, topgallant, royal)	
		Ease the buntlines, bunt-leechlines, and clewlines (downhauls) Haul away on the sheets Set the royal sheet jiggers when appropriate (All available crew lay to the halyards when sheeting home is complete)
	(Mainmast captain calls for both mainmast and foremast) **On the main, on the fore, walk away with the halyard**	
		Haul away on the halyard by walking away Topmen ensure yards rise free and clear
	(Fore and main) **Hand-over-hand the halyard**	
		Haul on the halyard while standing in place, keeping at least one hand on the halyard at all times
	(Fore and main) **That's well**	
		Stop hauling and hold the halyard with both hands
	(Fore and main) **Pass the stopper and belay**	
		Halyardman passes the stopper and calls "Easy Up" Crew eases line by extending their arms without releasing it Halyardman calls "Stopper's Holding" Halyardman calls "Up Behind" Crew drops halyard IMMEDIATELY Crewman nearest the turning block takes the halyard to the pin and when belayed calls "All Fast"

Commands

Captain	Mast Captain	Actions
Stand by the braces		(We usually brace around before setting the foresail and mainsail. Bracing is covered in the following section on Tacking Commands and Actions.)
Set the mainsail, set the foresail	(Fore and main) **On the main (fore)**	
	Ease the bunts and clew garnets	Ease the buntlines, clew garnets, and leechlines
	Haul away on the tack and sheet	Haul away on the sheets and tacks Board the tack jigger to the windward tack

Tacking – The Captain's Perspective

In this section, Captain Goben provides a description of what happens during a *Star* tacking maneuver. Once again, it describes what he looks for in terms of ship movement, wind conditions, sail behavior, etc., in order to decide what commands to give, and when.

Generally before a tack, the ship should be sailing "full and by", pointing close to the wind, with good speed. At this time, the luffs (leading edges) of the royals and topgallants should just be folding. All lower sails should be drawing well.

If the ship is a bit slow, the helmsman should fall off a bit, just to gather a little extra speed.

When all is ready, the command **"Ready About"** is given. At this command, all mast captains assemble their crews to their "stations for stays". When each crew is at its station, the mast captains report **"Manned and Ready"**.

At the command **"Helm's A'lee"**, the helmsman puts the helm down to begin to turn the vessel into the wind. On a vessel with a large rudder, the turn is done in increments to avoid the braking effect. On the *Star*, the rudder is so small the turn is done all at once.

As the ship starts to turn upwind, the next command is **"Ease the Headsails"** or "**Let Fly the Headsails"**. This eases the wind pressure in the forward end of the ship, allowing the ship to continue to turn.

At nearly the same time, the command of **"Spanker Boom Amidships"** is given in order to drive the ship upwind and increase the pressure on the aft end. In light winds, the spanker may even be backed without further command.

The mainsail and foresail hinder visibility without assisting in the tack, so as the ship drives up, the order is given to **"Rise Tacks and Sheets"**. These sails are then clewed and bunted up, and left in their gear during the maneuver. We often douse the mizzen topmast staysail at this time and set it after the tack. Some ships, such as the USCG *Eagle* tack with the foresail set. On the *Star* we do not, partly due to numbers of crew.

As the ship comes closer to the wind, the leading edges of the square sails will all begin to luff, then to back. At the point where this luffing occurs all the way down the windward side of the squares on the main, the call is given for **"Mainsail Haul"**. As this point, the five square sails of the main stack are braced entirely across, until they are hard over on the other side. If this bracing of the main stack is done too early, the sails will backwind, acting as a large brake. The ship may then "miss stays" and not be able to complete the tack. If done too late, the yards will be difficult to brace. Done at the proper time, the main sails come across quickly, with little backing effect.

During the tack the ship is very likely to lose way, and even gain sternway. The helm is sometimes centered, or reversed if necessary. As the ship may be stopped, it is often difficult to judge the progress of the turn. In this case, the ship's compass is observed, as it plainly will show the swing of the ship.

When the ship's head is into the wind, it is often helpful to backwind the headsails. The command is either **"Back the Headsails"** or **"Haul Aft the Headsail Sheets"**. By holding the sails aback, the turning moment on the bow is increased dramatically.

When the head is clearly through the wind and the main stack is beginning to draw, the command is given to **"Let Go and Haul"**. At this time, the fore stack is braced hard to the opposite side. Also, the spanker is eased so as not to hold the ship's head into the wind. The ship should then be gathering some headway, and the helm is trimmed accordingly.

At this point also, the order is called to **"Cross the Headsails"**. They are then trimmed on the new tack.

Finally, if the courses (foresail and mainsail) are desired, they are set on the new tack and the ship is brought up to full-and-by.

Tacking Commands and Actions

In the previous section, the Captain provided a description of the mechanics of tacking the *Star of India*, and the logic behind why and when he issues the commands for the tacking evolution. The following gives a concise summary of the sequence of tacking commands given by the Captain and mast captains, and the resulting crew actions.

Commands

Captain	Mast Captain	Actions
Ready about		
	(All masts) **Ready about**	Crew goes to their first stations for tacking the ship Unboard the tack jiggers, fake out braces
	Fore (main, mizzen) manned and ready	(All mast captains report when all stations for that mast are manned and ready)
Helm's a'lee		Notifies the crew that the maneuver has begun Helmsman turns the wheel to head into the wind
Ease the headsails	(Fore) **Ease the headsail sheets**	Let fly the headsail sheets until the sails are ripped to pieces
Spanker boom amidships		
	(Mizzen) **Haul away on the spanker sheet**	
	Ease and shift the spanker boom tackle	Haul on the spanker sheet Ease the boom tackle and shift it to the weather side
Rise tacks and sheets	(Fore and main) **Rise tacks and sheets**	Ease the tacks and sheets Haul away on the clew garnets to their marks Haul away on the leechlines to their marks Haul away on the buntlines to their marks

Commands

Captain	**Mast Captain**	**Actions**
	(Mizzen) **Take in the mizzen topmast staysail**	Douse the mizzen topmast staysail
Mainsail haul	(Main) **On the main**	
	Ease the port (starboard) braces	
	Haul away on the starboard (port) braces	Ease the leeward braces to their marks Haul away on the windward braces to their marks Haul on the windward lifts and ease the leeward lifts to remove the cockbill as the yards come around
Back the headsails	(Fore) **Back the headsails**	Headsail sheets are taken in until the forecastle-head crew takes control Forecastle-head crew pushes and holds the headsails to windward from the forecastle head (Mizzen) Ease the spanker sheet Haul away on the boom tackle Shift the mizzen staysail sheet
Let go and haul	(Fore) **Let go and haul**	Ease the windward braces to their marks Haul away on the leeward braces to their marks Haul on the leeward lifts and ease the windward lifts to remove the cockbill as the yards come around (Main) Shift main topgallant and main topmast staysail sheets

Commands

Captain	Mast Captain	Actions
Cross the headsails	(Fore) **Cross the headsails**	Forecastle-head crew hauls clews of headsails over the stays
	Haul away on the leeward sheets	Haul away on the headsail sheets on the new leeward side
Set the mainsail, set the foresail	(Fore and main) **On the main (fore)**	
	Ease the bunts and clew garnets	Ease the buntlines, clew garnets, and leechlines
	Haul away on the tack and sheet	Haul away on the sheets and tacks Board the tack jigger to the windward tack
	(Mizzen) **Set the mizzen topmast staysail**	Set the mizzen topmast staysail
		(After the sails are set) All masts trim the sails
		(Fore/main actions) Fan the yards

Wearing Ship – The Captain's Perspective

Following the format of previous sections, Captain Goben now gives us the mechanics of wearing ship, what he looks for, and the logic of events during this evolution.

Wearing a square-rigger such as the *Star of India* is the equivalent of jibing a modern boat. That is, it is turning the vessel through the wind line while heading downwind. It is also different from tacking in that there is constant wind in the sails, so the vessel does not stop as it often does during a tack. Although it may seem easier than tacking, wearing ship is more labor intensive since all sails must be handled at once rather than in steps. This prevents the sharing of crew among stations.

From full-and-by, or any other point of sail, the procedures are as follows.

When the ship has ample room to maneuver, the command is given to **"Stand By to Wear Ship".** The crew goes to their stations and stands by. The mast captains report when manned and ready.

The command of **"Wear-O"** begins the wear. The helm is put "up", that is, turned away from the wind. This may be done fast or slow as the desired room and time dictate.

At this time, several sails aft are doused without further command. The gaff-topsail is taken in, and the spanker is doused. This is for two reasons. The sail area of the spanker that far aft would make it very difficult for the vessel to head off of the wind. Also, if the spanker was left to cross while set it would be very dangerous, as the wind tends to push it over quickly, like the slamming of a door. The mizzen topmast staysail is also doused at the same time.

If the vessel is short of crew or if it is somewhat windy, the command will be given to **"Rise Tacks and Sheets".** This is the same as during a tack. The mainsail and the foresail are brought up into their gear. This tends to free up some crew during the wear, and also helps visibility from aft. Sometimes, however, it is desirable to leave the foresail set, especially in light winds. Doing this keeps the wind pressure forward on the vessel, which also helps in the turn.

As the vessel turns, the intent is to keep the square sails drawing. This is done by bracing the main and fore squares slowly, but in unison, attempting to keep them at roughly right angles to the wind. The mainmast captain gives the commands for swinging the main yards, and the foremast captain echoes the commands for the fore yards. The first mate, who is responsible for ensuring both sets of sails come around together, stands on the deckhouse where he can see both sail stacks and calls out any commands necessary to keep them moving in a synchronized manner.

When the ship is heading dead downwind, the yards should be square, and all staysails and headsails that are set will be blanketed by the square sails. At this point, the command is to **"Cross the Headsails".** As this is being done, all other staysails are crossed without separate command.

When the ship is fully through the wind, the spanker and all other doused sails are normally reset as they were before the wear. If the ship is to sail full-and-by again, the helmsman comes to that course, and all sails are braced sharp to the new tack. However, if a new course is desired, it is given to the helmsman during the turn and he will steady up on it as soon as it is reached. At this time, the command is given to **"Set the Mainsail, Set the Foresail"** (obviously, the foresail is set only if it was doused during Rise Tacks and Sheets).

The advantage of a wear over a tack is that it can be done in conditions where a tack would be dangerous or impractical. The disadvantages are the amount of crew necessary to complete the maneuver and the loss of considerable distance downwind.

Wearing Ship Commands and Actions

In the previous section, the Captain provided a description of the mechanics of wearing ship. The following now gives a concise summary of the sequence of wearing commands given by the Captain and mast captains, and the resulting crew actions.

Commands

Captain	Mast Captain	Actions
Stand by to wear ship		
	(Fore and main) **Stations for stays**	Crew goes to their first stations for wearing the ship Unboard the tack jiggers, fake out braces
	(Mizzen) **Man the gaff topsail gear**	Crew goes to stations for dousing the gaff topsail
	Fore (main, mizzen) manned and ready	(All mast captains report when all stations for that mast are manned and ready)
Wear-o	(Mizzen) **Ease the gaff topsail halyard Haul away on the inhaul Hold the gaff topsail halyard** **Throw off the gaff topsail sheet** **Throw off the gaff topsail tack**	Crew performs each action as commands are given
	Man the spanker gear	Crew goes to stations for dousing the spanker
	Ease away on the spanker foot outhaul **Haul away on the spanker foot inhaul** **Haul away on the brails** **Ease the spanker head outhaul** **Throw off the spanker head outhaul** **Haul away on the spanker head inhaul**	Crew performs each action as commands are given

Commands

Captain	Mast Captain	Actions
Rise tacks and sheets		
	(Fore and main) **Rise tacks and sheets**	Ease the tacks and sheets Haul away on the clew garnets to their marks Haul away on the leechlines to their marks Haul away on the buntlines to their marks
	(Mizzen) **Take in the mizzen topmast staysail**	Douse the mizzen topmast staysail
	(Fore and main) **Man the braces**	Crew goes to their stations for bracing around
	Ease the port (starboard) braces	
	Haul away on the starboard (port) braces	Progressively ease the windward braces Progressively haul away on the leeward braces Haul on the windward lifts and ease the leeward lifts progressively to remove the cockbill as the yards come around
	(Mizzen) **Haul away on the spanker sheet**	
	Ease the spanker boom tackle	
	Shift the spanker boom tackle	Shift the spanker boom from windward to leeward Ease the gaff vang
	Ease the spanker sheet **Haul away on the spanker boom tackle**	Crew performs each action as commands are given

Commands

Captain	Mast Captain	Actions
Cross the headsails	(Fore) **Cross the headsails**	
	Haul away on the leeward sheets	Forecastle-head crew hauls clews of headsails over the stays Haul away on the headsail sheets on the new leeward side (Main and mizzen re-sheet all staysails for the new course)
	(Mizzen) **Man the spanker gear** **Throw off the brails** **Throw off the head inhaul** **Haul away on the spanker head outhaul** **Tend the spanker foot inhaul** **Man the spanker foot outhaul** **Haul the spanker foot outhaul**	Crew performs each action as commands are given
	(Fore and main) **Ease the port (starboard) braces to the marks** **Haul the starboard (port) braces taut**	Crew performs each action as commands are given

Commands

Captain	Mast Captain	Actions
Set the mainsail, set the foresail	(Fore and main) **On the main (fore)**	
	Ease the bunts and clew garnets	Ease the buntlines, clew garnets, and leechlines
	Haul away on the tack and sheet	Haul away on the sheets and tacks Board the tack jigger to windward tack
	(Mizzen) **Set the mizzen topmast staysail**	Set the mizzen topmast staysail
	Man the gaff topsail gear Ease the gaff topsail inhaul Haul away on the gaff topsail halyard **Haul away on the gaff topsail sheet** **Set the gaff topsail tack** **Man the spanker sheet** **Tend the spanker boom tackle** **Haul away on the spanker sheet**	Crew performs each action as commands are given

Dousing Sail – The Captain's Perspective

The order in which the sails are doused is again at the discretion of the Captain. If there are no special maneuvers planned however, the order is generally the reverse of setting. Also, as in setting, the Captain will give the order to douse, but not call the sequence on specific sails. This is again left to the Mast Captains.

There are also no specific commands for this either. We will generally use **"Stand by to take sail".** Individual sails may be named at this point, if there is a desire for a certain order. Also, as in setting, there is less strain on the rig if the yards are squared first.

Normally, we will **"Rise Tacks and Sheets",** as normal, to get the mainsail and foresail in their gear. The Mast Captains will then direct the crew to **"Man the Royal Gear",** as the squares (except the courses) are doused starting from the top.

We will normally have the Mainmast Captain coordinate both the main and foremast crews for this, since it is still desirable to have the masts work in unison. Unless otherwise directed, the Mainmast Captain will douse all remaining squares. That is, the royals, topgallants, and topsails.

After the squares are doused, the fore and aft sails are also done in reverse order. As in setting, the balance of the sails relative to the ship should be maintained. We will generally douse the mizzen topmast staysail and the main topgallant staysail together, then the flying jib and gaff topsail. The outer and inner jibs are termed "headsails" when together, and are taken in with the spanker. And finally, the mizzen staysail, main topmast staysail and fore topmast staysail are doused at the same time.

When all sail is taken in, the braces are square, and the yards are in their lifts, the order is given to **"Lay Aloft and Furl".** Those who are qualified and assigned to work aloft will do so, while the rest of the crew is needed to tend lines on deck.

Dousing Sail Commands and Actions

In the previous section, the Captain provided a description of the mechanics of dousing the sails. The following now gives a concise summary of the sequence of commands given by the Captain and mast captains when dousing sail, and the resulting crew actions .

Commands

Captain	Mast Captain	Actions
Stand by to take Sail		All mast crews go to stations for dousing sail Remove the tack jigges Fake down the halyards Topmen lay aloft
	(Fore, Main and Mizzen) **Manned and Ready**	
Rise tacks and sheets		
	(Fore and main) **Rise tacks and sheets**	Ease the tacks and sheets Haul away on the clew garnets to their marks Haul away on the leechlines to their marks Haul away on the buntlines to their marks
Douse all squares	(Fore and main) **Man the royal (topgallant, upper topsail) gear**	
		Man the buntlines, clewlines, and sheets Make all lines ready to run Remove and stow the royal sheet jiggers
	(Mainmast captain calls for both mainmast and foremast) **On the main, on the fore, clew down the royal (topgallant, upper topsail)**	
		Ease the halyard smartly but in control Take slack out of the buntlines and clewlines as the yard comes down
		(Halyard is eased until the yard is down. Halyardman calls "in its lifts")

Commands

Captain	**Mast Captain**	**Actions**
	(Fore and main) **Clew up the royal (topgallant, upper topsail)**	
		Cast off the sheets Haul away on the clewlines and buntlines until the sail is in its gear NOTE: The upper topsails don't have clewlines. They have downhauls that are attached between the upper and lower topsail yardarms. Like the clewlines, the downhauls are hauled evenly as the yard is lowered.
	(Mainmast captain calls for both mainmast and foremast) **On the main, on the fore, man the lower topsail gear**	
		Man the buntlines, clewlines, and sheets Make all lines ready to run
	(Fore and main) **Clew up the lower topsail**	
		Cast off the sheets Haul away on the clewlines and buntlines until the sail is in its gear

Commands

Captain	Mast Captain	Actions
Take in the main topgallant and mizzen topmast staysails		
	(Main) **Man the main topgallant staysail gear**	
		Man the halyard, downhaul, and sheet
	(Mizzen) **Man the mizzen topmast staysail gear**	
		Man the halyard, downhaul, and sheet
	(Main and mizzen) **On the main topgallant staysail** **(On the mizzen topmast staysail** **Ease the halyard** **Haul away on the downhaul** **Tend the sheet**	
		Coordinate easing the halyards, hauling the downhauls, and tending the sheets to control the sails while dousing

Commands

Captain	**Mast Captain**	**Actions**
Take in the flying jib	(Fore) **Man the flying jib gear**	Man the halyard, downhaul, and sheets
Take in the gaff topsail	(Mizzen) **Ease the gaff topsail halyard Haul away on the inhaul Hold the gaff topsail halyard** **Throw off the gaff topsail sheet** **Throw off the gaff topsail tack**	Crew performs each action as commands are given
Take in the headsails and spanker	(Fore) **Man the outer and inner jib gear**	Remove the halyard jiggers Man the halyards, downhauls, and sheets
	Ease the outer (inner) jib halyard **Haul away on the outer (inner) jib downhaul** **Tend the sheets**	Ease the outer jib halyard Haul on the outer jib downhaul (The outer jib halyard is eased and the downhaul is hauled five or six times, then the inner jib actions begin. This brings the two jibs down together and evenly.) Tend both sets of sheets
	(Mizzen) **Man the spanker gear**	Crew goes to stations for dousing the spanker
	Ease away on the spanker foot outhaul	

Commands

Captain	Mast Captain	Actions
	Haul away on the spanker foot inhaul **Haul away on the brails** **Ease the spanker head outhaul** **Throw off the spanker head outhaul** **Haul away on the spanker head inhaul**	Crew performs each action as commands are given
Take in the staysails	(Mainmast captain calls for all three masts (fore topmast staysail, main topmast staysail, mizzen staysail))	
	Man the staysail gear	Crews man their applicable halyards, downhauls, and sheets Fore crew removes fore topmast staysail halyard jigger Main crew removes main topmast staysail halyard jigger
	On the fore, on the main, on the mizzen **Ease the halyards** **Haul away on the downhauls** **Tend the sheets**	Crews coordinate easing the halyards, hauling the downhauls, and controlling the sheets to bring all three sails down together
Lay aloft and furl	(Main) **Upper crew lay aloft and furl**	Upper crew lays to royal and topgallant yards, furls sails, and secures with gaskets Part of the lower crew lays to upper topsail yard, then to lower topsail yards, rest climb to mainsail yard, furl sails, and secure with gaskets
	(Fore) **Lay out, lay aloft, and furl**	

Commands

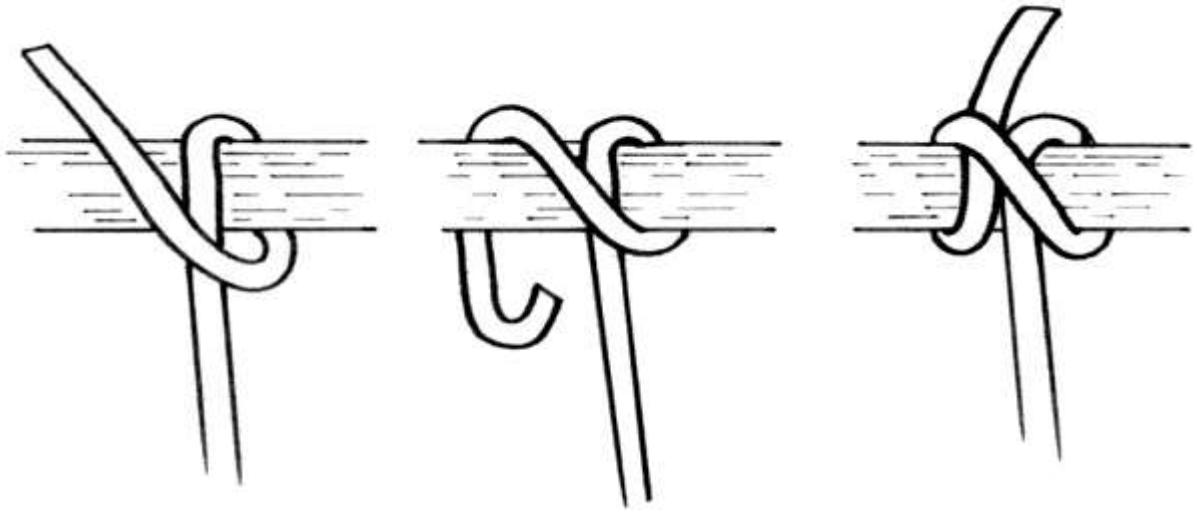
Captain	Mast Captain	Actions
		Upper crew lays to royal and topgallant yards, furls sails, and secures with gaskets Part of the lower crew lays to upper topsail yard, then to lower topsail yard, rest climb to mainsail yard, furl sails, and secure with gaskets Forecastle-head crew lays out on the jib boom, furls sails, and secures with gaskets
	(Mizzen) **Lay aloft and furl**	Lay to the crane-lines, release the spanker furling line from the hooks on the mast, furl the spanker, and secure it with the furling line Furl the gaff topsail and secure with gaskets

Basic Knots Used Aboard the *Star of India*

This section describes the basic knots used aboard this vessel. Learn how to tie the knots correctly and, perhaps equally as important, when to tie a specific knot. Much of your work aboard the *Star* will require the use of these knots. This section also includes descriptions of how to fake out and coil lines. Failure to do either of these properly could delay or stop a maneuver, cause damage to the ship, and cause injury to crew or guests.

Clove Hitch

Used to secure gaskets to jackstays. Easy to adjust length by pulling on one end or the other.



1 **2** **3**

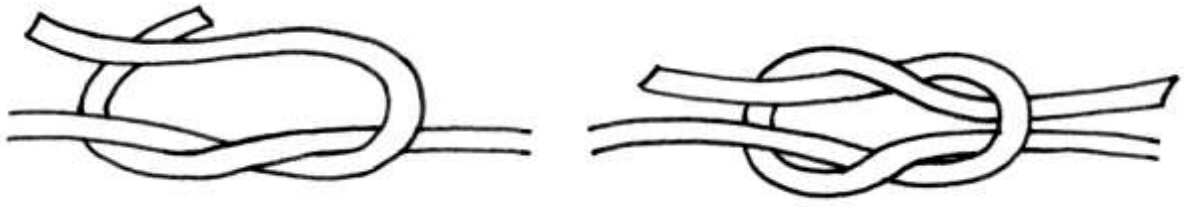
1. Wrap the line over and behind the bar. Bring the bitter end up on the right side of the standing part and cross over the standing part.

2. Continue to wrap over and behind the bar. Bring the bitter end by the left side of the standing part.

3. Insert the bitter end under the last wrap so that the bitter end and standing part are together.

Square Knot

This knot is used primarily for tying off the gaskets and robands. It is not to be used for joining two lines that carry a large load.

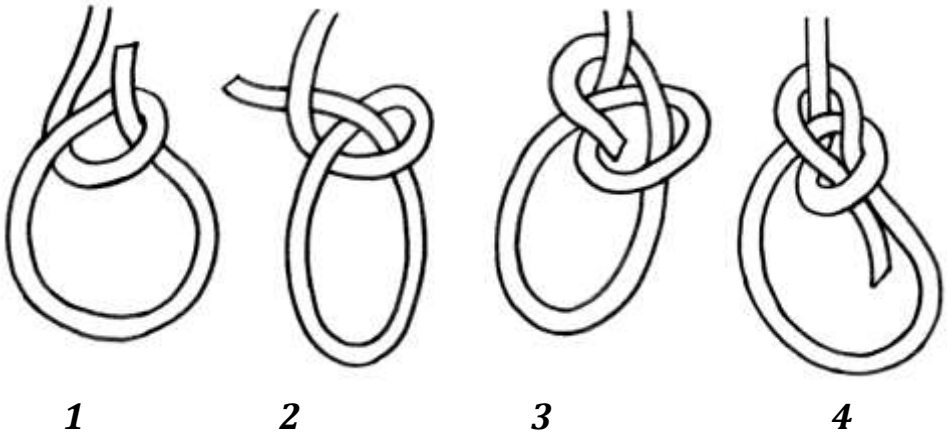


1 ***2***

1. Take a turn with the left-hand line around the right-hand line.
2. Take a turn with the left-hand line around the right-hand and pull tight.
3. The bitter ends should lie next to their corresponding standing parts.

Bowline

The bowline is normally used to tie a line to an object or to form a fixed loop at the end of a line. This knot will not jam, slip or come loose, and is easy to untie.

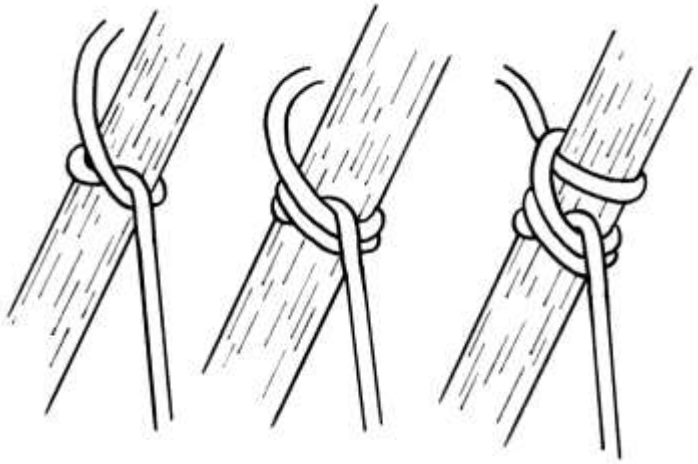


1 ***2*** ***3*** ***4***

1. Form a turn in the standing part and bring the bitter end up through the turn.
2. Pass the bitter end behind the standing part.
3. Bring the bitter end down through the turn.
4. Hold the turn and bitter end together and pull the standing part to tighten the knot.

Stopper Hitch

The stopper hitch is most often used to temporary hold a halyard so that it can be belayed. Always have the crew ease the load to the stopper to see if the stopper is holding before the crew releases the line.



1 ***2*** ***3***

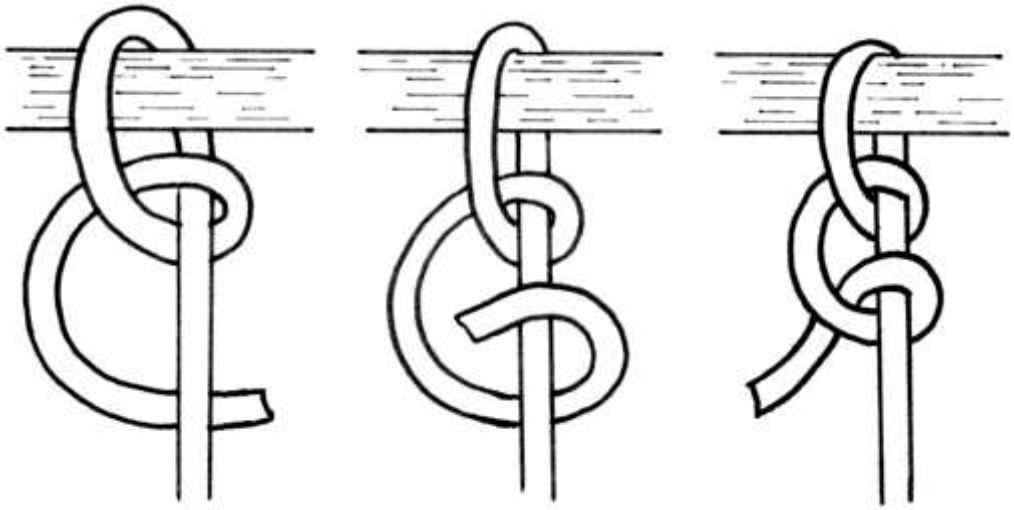
1. Pass the bitter end around the halyard. Pass the bitter end under the standing part.

2. Pass the bitter end around the halyard again and lay on top of the existing wrap. Pass the bitter end under the standing part.

3. Pull up hard on the bitter end to set the stopper. Twist the excess up the halyard and hold, or if the stopper will be on longer, use a half hitch as shown. Stopper should now hold the load.

Two Half Hitches

This knot is used to temporarily hold light loads.



1 ***2*** ***3***

1. Pass the bitter end over bar from behind, then behind the standing part and through the eye of the loop.

2. The first hitch is complete. Pass the bitter end behind the standing part.

3. Pass the bitter end through the loop and pull tight.

Becket Hitch (Harness Knot)

The Becket Hitch, which was the knot we used for our original safety harnesses, is no longer required.

Double Sheet Bend

The double sheet bend, used to tie two lengths of line together.

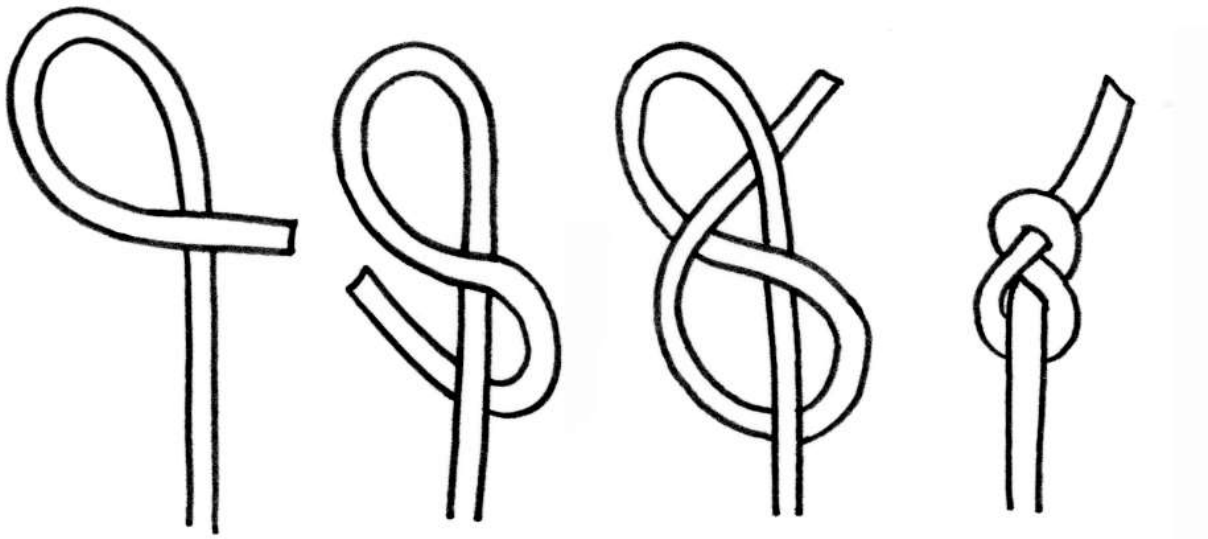
See
http://www.northwoodsguides.com/double_sheet.htm

and/or

http://www.animatedknots.com/sheetbend/

Figure Eight Knot

Used as a stopper knot at the end of sheets, tacks, etc. It does not jam and is easy to untie.



1 ***2*** ***3*** ***4***

1. Take the bitter end of the line and lay it across the standing part.
2. Wrap the bitter end around the standing part.
3. Pass the bitter end through the loop.
4. Pull tight.

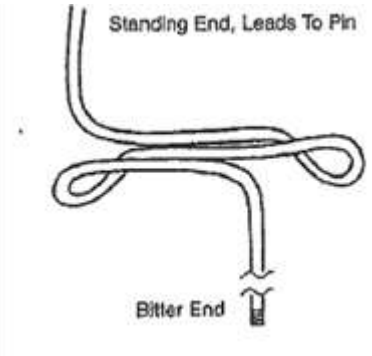
Line Handling

This section describes three of the most common line-handling activities aboard the *Star of India*. The ability to fake out, coil, and haul on lines is central to safe, efficient operation of the ship. It also helps keep the *Star* looking ship-shape by ensuring all lines are made up in the same fashion.

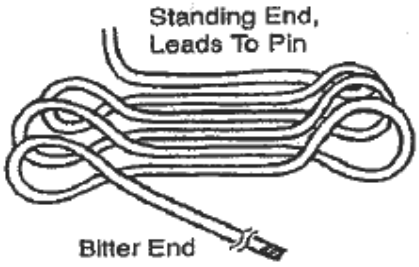
Faking a Line

Lines are faked out on deck to prepare them for running clear without fouling. Lines typically faked out include the braces, halyards, and staysail and headsail downhauls. Fakes are accomplished by one to three crewmembers, depending on the line length, and should be completed smartly. The line must first be properly pinned.

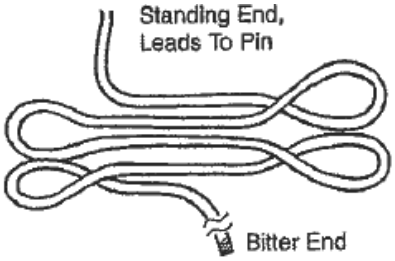
1. Starting at the pin, lay a length of the standing part on the deck. Fashion a bight (loop) on top. Then lay out an equal length in the opposite direction parallel to the first length of line. Fashion a similar loop on top.

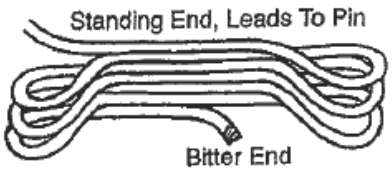


2. Continue laying out the line, with each loop slightly overlapping in a figure-eight fashion. The bitter end is laid out at a right angle.

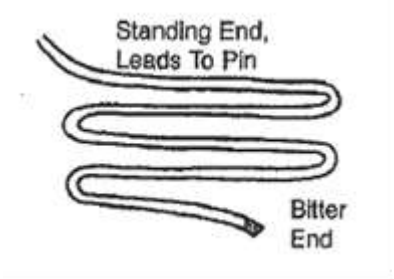


3. Beginning with the last loop laid down, capsize each loop twice (take two separate turns of 180 degrees each to rotate it 360 degrees) so the line pays out from the top of the fake. Proceed until all the loops are capsized and slightly overlapped.





An alternate method of preparing a line to run is to snake it out on deck. This is usually done when there is not time to lay down a proper fake, however, the headsail downhauls are always run out using this method.



Hauling on Lines

The *Star of India* is controlled primarily through the act of crewmembers hauling and easing lines. Lines are hauled to set sail, raise yards, tack or wear ship, douse sail, and tie up at the dock. Hauling on lines is probably the most physically demanding task crewmembers have. Remember, almost all lines on the *Star* have a counterpart that must be eased, therefore, easing lines is also considered an integral part of hauling.

There are three methods of hauling used on the *Star*: hand-over-hand, walking away, and swaying. Prior to commands to haul on a line, the crew will usually be ordered to man the line, e.g., "Man the Braces".

1. Hand-over-hand involves hauling on a line by pulling the line toward you with alternating hands. One hand always grips the line during hand-over-hand hauling. This method of hauling can be used to haul lines down to the deck, haul lines laterally across your body, or haul lines up from below. Hand-over-hand hauling requires primarily upper body strength. This method is the most frequently used method aboard the *Star*, and is usually used to haul on buntlines, sheets, tacks, clewlines, downhauls, brails, inhauls, outhauls, braces, vangs, and halyards. The command "Haul Away" usually signifies that a hand-over-hand hauling technique will be used.

2. Walking away involves a large number of crewmembers who grab a line and, while holding it, walk away in unison. When each crewmember reaches the release point, he/she drops the line and moves smartly back to pick up the line again at the front. This method is used to haul lines laterally and relies on the crewmember's lower-body strength. It is typically used to haul on the halyards that raise the yards. The command "Walk Away" indicates that this method of hauling will be used.

   For additional mechanical advantage, the capstan is used when hauling. Using the capstan involves wrapping the line three times around the capstan and, while one crewmember tails the bitter end, other crewmembers place capstan-bars in the capstan and push on the bars as they walk around the capstan. This method is used to haul lines laterally and relies on a crewmember's lower body strength. The mechanical advantage provided by the capstan also reduces the apparent load on the crew. A capstan is used to raise the anchor, and to raise yards when insufficient crew is available to hand-over-hand or walk away with a halyard. The command "Take a Turn Around the Capstan" initiates this method of hauling.

3. Swaying involves at least two crewmembers. One crewmember, the tailer, tails the line while the swayer grasps it at about chest height. Using his/her entire body, the swayer hauls the line away from its natural fall and then "pushes" the line towards the turning point (block, sway

hook) between the swayer and the tailer. The tailer keeps the line from running during the swayer's haul, and hauls in the slack that is fed through the turning point by the swayer. Swaying can be used anywhere a line can be effectively tailed, but is most effective for lines led from above because the swayer can use most of his/her body weight. Swaying is mostly used to adjust the lifts and to tighten the luff on staysails and headsails. Swaying is usually not commanded, but is done when necessary.

After hauling, lines are belayed and made up for the next evolution. Once a line is belayed, the belaying crewmember should call out "All Fast".

Orders may also be given to haul a line handsomely or smartly. Handsomely means methodically and deliberately, usually at a moderate pace. Smartly means to haul the line quickly but without being reckless.

Easing is equally as important as hauling, since most lines to be hauled are opposed by lines which must be eased. Also, lines that have been hauled when setting sail, such as halyards or sheets, must be eased when dousing. The primary easing methods used on the *Star* are easing a line around a pin (or other turning device), and easing a line from a capstan. There are four important safety points to remember when easing a line.

1. Understand what the line to be eased controls, the amount of load on the line, and whether easing the line places anyone in danger.

2. Stop the line from running and call "Avast" if you see any potentially dangerous situation.

3. Never take a line off a pin unless you are ordered to do so and there is adequate crew ready to control the line.
4. Be sure that the line will run when it is eased. For this reason, properly throwing down a coil or faking the line prior to easing is important.

Easing a line around a pin involves throwing down the coil and faking (if necessary) and taking turns off the pin until there are enough turns to help safely control the line, but not hinder the crewmembers who are hauling on the opposing line. For some lines, one turn may be adequate. For halyards and other lines under great loads, two turns should be maintained at all times. Easing a line is an active task. At all times, the crewmember easing the line to the pin (keeping hands at least two feet away from the pin) must control the speed of the running line and be safety conscious. If the crewmember hears "Avast", easing of the line must be stopped **immediately** until the order to ease the line is given again. Once the line is eased to its fullest it is belayed. Once the line is belayed, the belaying crewmember should call out "All Fast".

Easing a line around the capstan is inherently more dangerous since larger loads are involved, and should only be done by experienced crewmembers. This method involves releasing the pressure from the bitter end until the line begins to run. No turns are removed from the capstan. Frequently, the line is cinched down and another crewmember must coax the line to move by using his/her palms and turning the line against the capstan until it moves. As with easing from a pin, this method is also an active task. At all times, the crewmember feeding the line to the capstan must control the rate of run and be especially safety conscious since a shipmate may be coaxing the line at the capstan. If the easing crewmember hears "Avast", easing should be stopped **immediately** until the order to ease the line is given again. If the line is to be held for longer than a few minutes, a stopper hitch should be passed to control the line.

Coiling a Line (Making up the deck)

Lines are coiled for several reasons. First, properly coiled lines reduce the risk of hockles when the lines are thrown down and run out. Second, lines made up uniformly project a sense of organization and pride in our work. To achieve these goals, all lines aboard the *Star of India* must be coiled using the same rules.

1. Start with the running part of the line and make a clockwise circle on the deck. Continue to lay the line on top of the previous coils, and finish with the bitter end on top.

2. **Always** coil lines in a clockwise direction.

3. Generally, coil sizes should allow the lines to hang approximately 18 to 20 inches above the deck at the pin rails, and 10 to 12 inches at the fife and poop-deck rails. Coils on the dog rail and brace benches will usually lay on the deck because these belaying points are so low.

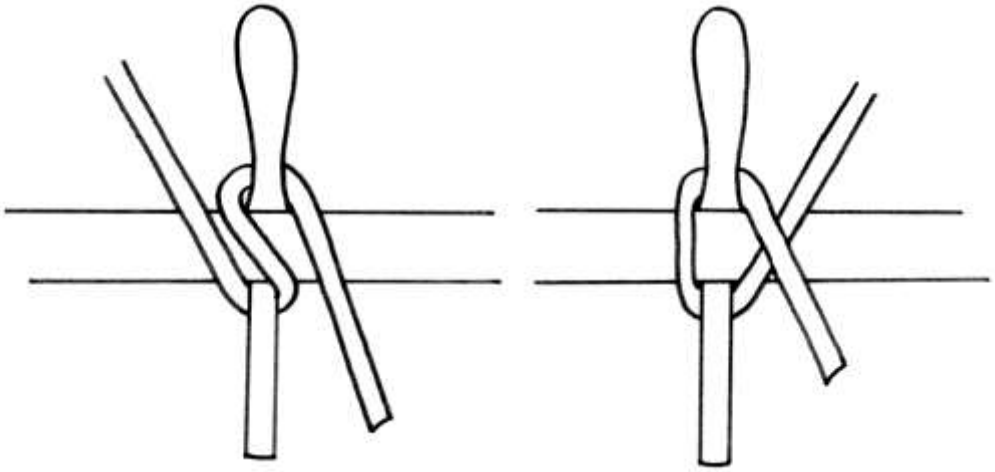
4. Pick up the coil so the running part is to the rail and the bitter end is on the outside of the coil facing you.

5. Make the coil up on the pin (or cleat) using a loop with a double twist, with the bitter end hanging down on the right side of the coil, in plain view and not hanging below the coil. If the bitter end hangs below the coil, a single, smaller loop can be made on the face of the coil.

By using this procedure, when it is time to run lines out, the coil can be thrown on the deck with the bitter end down (not tangled in the coils) and the line will run free. At the same time, by keeping the coils uniform in size and shape on the pins we are projecting the pride we, as a crew, take in our work and in our ship.

Belay to Pin

Belaying pins are used to hold loads on lines. Never use a locking hitch on any pins. Always check for load on a line before releasing.



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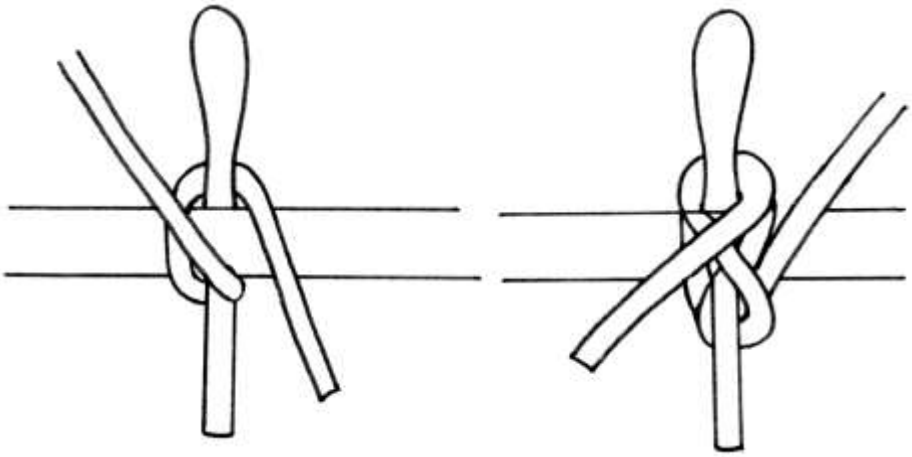

3 – WRONG! **4**

1. Load is from aloft and to the left of the pin. Wrap the line under the rail and behind the pin. Cross has been started. Cross the middle each time you wrap from the top or bottom.

2. Load is from aloft and to the right of the pin. Wrap the line under the rail and behind the pin. Crossing from bottom to top would reverse the proper direction of the wrap so you must first correct the direction of the wrap. Always wrap around the top of the pin in a clockwise direction. Therefore, from the bottom of the pin go straight up to the top of the pin without crossing. Start crossing when going from top to bottom.

3. This is an example of a foul lead. Load from aloft crosses in front of the pin and starts on the opposite side. This will jam the bitter end against the rail and make it difficult to loosen quickly.

4. Load is from aloft and to the right with three wraps to belay the line. Cinch the third wrap between the first and second to lock the line.

01/20/2014

AppendixA

Terminology

The terminology in this section is used aboard the *Star of India*. Many terms have additional or alternate meanings aboard other vessels.

A

aback, The position of the sails when the wind presses them toward the mast.

abaft, Toward the stern of the ship relative to a defined position.

abeam, At right angles to the centerline of the boat. Amidships.

about, Across the wind in relation to the bow.

adrift, Unmoored. Floating with the wind and tide. This may refer to a vessel or various parts of a vessel.

aft, The stern or towards the stern of a boat.

afterdeck, That part of the deck aft of the midships.

ahead, In front of the vessel.

alee, The position of the helm when in the opposite direction from which the wind blows. On the opposite side of the wind.

aloft, The area above the main deck.

amidships, The middle of the ship whether longitudinally or laterally.

anchor chains, These chains are shackled to the principal anchors at the bow (bower anchors). The anchor on the main deck, forward, is a spare and known as a kedge anchor.

apparent wind, The direction of the wind relative to the moving ship.

arm, The extreme ends of a yard (yardarms).

astern, Behind. In the after part of a vessel; behind the vessel; in her wake.

athwartships, From one side to the other side of a ship.

avast, The order to immediately stop an operation being performed.

aweigh, Refers to the anchor being just off the bottom.

B

backsplice, Finish off the end of a rope by tucking the strands back into themselves.

backstay, Standing rigging leading from the mast heads aft to the rail.

baggywrinkle, Chafing gear on stays and shrouds made of old rope yarn.

bare poles, When a ship has no sails set.

bark, A three-masted (or more) vessel where all except the last mast are square rigged and that mast (mizzenmast) is fore-and-aft rigged.

barque, See bark

bars, For turning the capstans

battens, Strips of wood put around hatches to seal them. Also, wood pieces tied between shrouds used for climbing, similar in function to ratlines.

beam, The measurement of a vessel at its greatest width.

beating, The process of sailing against the wind by tacking in a zigzag course.

becket, The eye at the base of a block for making fast the standing end of a fall.

becket block, A block with an eye at one end for the standing end of a fall.

belay, (1) To make a line fast by turns around a pin. (2) To stop or cease.

belaying pin, A vertical pin to which lines for running rigging are secured.

below, The area beneath the deck.

bend, Generic name for a knot.

bend on, To rig a sail to a yard or stay.

best bower, The anchor on the starboard side of the ship.

bibbs, Timber bolted to the hounds of a mast to support the trestle-trees.

bight, The name by which the loop of a rope is known. Also, a handful of sail when furling.

bilge, The lowest part of a ship inside the hull.

binnacle, A box near the helm containing the compass of a ship.

bitter end, The extreme, non-attached end of a line.

bitt, A pair of iron or wooden heads set vertically in the deck to which sheets, mooring, or towing lines are secured.

block, A wooden or metal case enclosing one or more pulleys (sheaves).

board the tack, Secure a special tackle called a tack jigger to the weather clew of the foresail or mainsail, and haul it down to the rail.

boat skids, A rack for holding small boats.

bobstay, A chain or cable running from the end of the bowsprit to the cutwater.

bollard, A strong, vertical, fitting fixed to a deck, dock, or landing to which a ship's mooring lines are made fast.

bolt rope, A rope sewn around the edges of a sail.

booby hatch, A small opening in the deck of a vessel used as an additional companionway to facilitate movement around the ship.

boom, A horizontal spar along the lower edge of a fore-and-aft sail.

boom crutch, A vertical support for the boom when not in use.

boatswain's (bosun's) chair, Seat usually attached to a gantline used to hoist a person aloft into the rigging.

boatswain's (bosun's) locker, Storage area for the ship's tools and maintenance supplies. Located all the way forward on the 'tweendeck.

bow, Front end of a vessel.

bowline, A knot with an eye or loop in the end of a rope.

bowsprit, The large metal spar projecting out over the bow that supports the jib boom.

bowsprit shrouds, Stays for lateral support of the bowsprit running from the bowsprit to the side of a ship.

boxhauling, A method of turning a ship by allowing the wind to push the ship back, and the bow to leeward, until the ship turns completely around.

brace, (1) A line attached to a yardarm and led aft that is used to swing the yard. (2) To swing the yards of a square-rigged ship by using the braces.

brace sharp, Where the yards of a square rigged ship have been braced at their greatest angle from square.

brace square, Where the yards of a square rigged ship are set at a 90-degree angle to the ship's centerline.

brail, A line attached to the leech of the spanker and led through a block that is used to haul the leech in to the mast.

breast line, A mooring line leading at an angle of about 90 degrees from the fore-and-aft line of the vessel to the wharf or to another vessel.

breastwork, The rails and stanchions on the foremost end of the poop.

bulkhead, A vertical wall running within the hull of a ship creating compartments.

bull's eye, A circular piece of hardwood, hollowed in the center, which is set into a strop and used as a fairlead for the buntlines on the face of a sail.

bulwarks, The sides of a ship that extend above the upper deck to prevent seas from washing over the deck.

bumpkin, A short boom that extends out from each side of a ship to which the brace blocks are attached.

bunt, The middle section of a square sail where it is cut full.

bunt-leechlines, Lines on the square sails used to furl the square sails by bringing the leech and foot up to the yard.

buntline, A line attached to the foot of a square sail used to haul the sail up to its yard for furling.

by the wind, as near as possible to the direction from which the wind is blowing

C

camel, A float placed between the ship and the dock for fending.

cap, A block of wood to combine together the head of one mast and the lower part of the mast above.

capstan, A mechanical device with a vertical revolving drum used for getting a mechanical advantage when hauling on a line.

capstan-bar, A heavy length of wood that is fitted into the pigeonholes of a capstan for turning the capstan drum.

carry away, When any part of the vessel's gear or rigging breaks or gives way.

cast off, To let a line go or, to undo the mooring lines in preparation of departing.

cat an anchor, Hoist the anchor to the cathead and make it fast.

catenary, A dip in a line or chain caused by the weight of the line itself.

cathead, A heavy piece of timber projecting from each bow of a ship for the purpose of holding the anchor.

caulk, To fill the seams of a vessel with oakum.

chafing gear, Cloth or other material put on lines and rigging to prevent damage caused by rubbing.

chain locker, Where the anchor chains are stowed (kept).

chain plates, Fittings near the bulwarks where the deadeyes for the shrouds are attached.

chain sheets, Chain fastened to the clews of a sail that the sheet is attached to.

charlie noble, A stovepipe fitting for the galley stove.

cheek block, A block attached to the yardarm through which square sail sheets are led.

cheeks, The sides of a block.

cleat, A "T" shaped fitting bolted to a dock or deck on which lines can be fastened.

clew, (1) The lower two corners of a square sail. (2) On a fore-and-aft sail it is the corner that the sheet is attached to.

clew down, To haul on the clewlines and ease the halyard while holding the sheets in order to settle a yard into its fixed lifts.

clew garnet, The line attached to the clew of the courses and is used to haul the clew up to the yard. (see also Garnet).

clewline, The line attached to the clew of a square sail used to haul the clew of the sail up to the yard.

clew up, To haul the clew of a square sail up to the yard by hauling on the clewline.

close hauled, Point of sail where a vessel is sailing as near to the wind as possible.(Also, **full and by** or **by the wind**)

clove hitch, A bend formed by two half hitches with the second reversed so that the standing part is between the hitches.

coaming, The raised edge around the hatches and other deck openings to prevent water on the deck from running below. There are coamings at the doors also.

cockbill, The position of the yards when not parallel with the deck.

collision bulkhead, A watertight wall 'thwart ship. (Crosswise from side to side.)

companionway, The steps that lead down from the deck.

cordage, A general term for line of all kinds.

courses, Common term for the lowest square sails on the main and fore mast of a square-rigged ship.

crane-line, A footrope leading from the shrouds to a mast.

cringle, A ring at the edge of a sail containing a thimble used for making rope and lines fast.

crosstrees, Spreaders fixed to the mast athwartships used to spread the shrouds.

cutwater, The forward edge of the stem of a ship.

D

dandyfunk, A dish resembling cake, and made from ship's biscuits which have been pounded into fragments.

davit, Curved cast-iron arms fitted with blocks and falls for raising and lowering the ship's boats.

deadeye, A circular piece of wood with three holes to reeve lanyards for the rigging.

dead man, A large bulge in a tightly furled sail resulting from poor furling.

deckhouse, A cabin erected on the main deck of a ship.

ditty bag, A small bag for personal items and tools.

dog rail, A rail on the forecastle head to which the headsail downhauls are belayed.

dolphin striker, A short spar extending below the cap of the bowsprit used for holding down the jib boom by means of stays.

donkey engine, A small auxiliary steam engine used to perform mechanical duties.

doubling, That portion of the mast where an upper mast overlaps the lower.

douse, To dump the wind out of a sail by hauling the sail up to the yard.

downhaul, A line for hauling down a jib or a staysail or an upper topsail yard.

drawing, When a sail is full of wind.
drumhead, The top of a capstan.
dunnage, Loose wood carried on the ship.

E

earring, A small line used to fasten the upper corners of a square sail to its yard.

earring tackle, A small tackle consisting of two small pulleys that is attached temporarily to the upper corner of a sail and the eye of the lift used to draw the sail tight on the yard.

ease, To pay out slowly and with care or to reduce strain on the line.

easy up, Command to slack a line under tension while still keeping control of the line.

eye of the wind, The exact direction from the which the wind blows. Also, dead to windward.

eye splice, A loop made in the end of a rope by turning the end back and interweaving the strands through the standing portion of the line.

F

fairlead, A block, ring, or other object that serves as a guide for leading a line to alter its direction or to clear obstructions.

fairlead board, A board with holes in it for running rigging to pass through.

fake, To lay out a line on the deck in such a way that the line will run clear without fouling.

falls, The line in a tackle that is rove through the blocks to create a mechanical advantage.

fanning, Bracing the weather yardarms slightly aft for each yard as you go higher.

fast, To secure something, as in a line belayed on a pin.

figurehead, The carved figure usually representing the name of the ship. This is EURTERPE (the Greek Goddess of Music), the original name of the ship.

fid, A round pin of wood tapered to a point used to open strands of cordage for splicing.

fiddle block, A block with long cheeks, with one sheave over the other, and the lower one being a smaller diameter than the upper one.

fife rail, A rail around the base of a mast that holds the belaying pins.

fish tackle, A large tackle consisting of triple sheaved blocks leading from the fore topmast head used to haul the anchor up onto the deck by the flukes.

Flemish coil, A line coiled spirally from the center and laid flat on the deck.

Flemish horse, A short footrope at the end of a yard.

foot, The bottom of a triangular or a square sail.

footrope, A rope, hanging below and aft of a yard from stirrups, for standing on when working.

fore-and-aft sail, A sail, either triangular or gaff rigged, that runs lengthwise on a ship.

forebrace, A rope attached to the fore-yardarm to change the position of the yard.

forecastle (fo'c's'le), The most forward cabin located in the bow of a ship. Where the sailing crew slept.

forecastle (fo'c's'le) head, The deck above the forecastle.

fore lower topsail, The sail on the yard above the foresail and below the fore upper topsail.

foremast, The most forward mast on the ship. Also the lowest section of the foremast.

fore royal, The sail on the yard above the fore topgallant

foresail, The lowest square sail on the foremast.

forestay, A rope leading from the fore masthead to the bow to keep the mast from falling back and, to hold a staysail.

foretop, The platform at the head of the foremast.

fore topgallant mast, The section of mast above the fore topmast on the fore mast.

fore topgallant sail, The sail on the yard above the fore upper topsail and below the fore royal on the foremast.

fore topmast, The section of mast above the fore mast and below the fore topgallant mast.

fore topmast staysail, A triangular sail bent onto the fore topmast stay.

fore upper topsail, The sail on the yard above the fore lower topsail and below the fore topgallant on the foremast.

foreyard, The lowest yard on the foremast.

founder, Ship sinking which results from flooding of the hull either through springing a leak or striking a rock.

frapping, To take several turns round the middle of a lashing or any number of ropes and drawing the parts tight together.

freeboard, The distance from the waterline to the upper deck measured at the waist.

full-and-by, Sailing as close to the wind as possible with the sails full and not lifting.

full-rigged, A ship with three or more masts and carrying square sails on all masts.

furl, To take in a sail and secure it.

futtock shrouds, Shrouds attached to the top on a lower mast that run downward and inward to the lower mast.

G

gaff, The spar to which the head of spanker is attached.

gaff-topsail, A fore-and-aft sail set over a gaff.

galley, The kitchen of a vessel.

gangway, The ramp on the side of a vessel where people embark and disembark.

gantline, A line rove through a block at the masthead used to haul things up and down the mast.

gasket, A line used to secure a sail when furled.

gudgeons, Metal clamps attached to the sternpost that receives a corresponding pintle attached to the rudder allowing the rudder to pivot.

gunwale (gun'l), The upper edge of the side of a boat.

guy, A line used to steady and support a spar in a horizontal or inclined position.

H

halyard, A line used to hoist a sail, flag, or yard aloft.

hand-over-hand, To haul rapidly on a line by passing your hands alternately one before the other keeping the line in motion.

handsomely, To haul on a line in a slow and careful manner. (moderately)

handy-billy, A small tackle with two blocks.

hanks, Small metal, open ended, hoops by which the luff of a jib or staysail is bent to the stays.

harden-up, To haul on a line to tighten it as much as possible.

hard laid, Rope which has been laid up tightly,

hatch, An opening in the deck for loading the ship.

hatch covers, Timber sections placed over the cargo hatches. These were, in turn, covered with a tarpaulin, lashed down, or fastened down with wooden battens and wedges. ("Batten down the hatches.")

haul, To pull upon a line.

hawsehole, Opening in the hull through which mooring lines are run, or somebody who is a big jerk.

hawser, Large diameter rope used for dock lines on a vessel.

head, (1) The top portion of a square sail. (2) The toilet on a vessel. (3) The top corner of a triangular fore-and-aft sail where the halyard is attached.

headrope, That portion of the boltrope of a square sail along the head of the sail.

headsails, All fore and aft sails forward of the foremast, as in the jibs.

heave around, To haul on a line with the aid of machinery such as a capstan.

heave-to, To lay a sailing ship on the wind with her helm a-lee and her sails trimmed so as she comes up to the wind she will fall off again on the same tack.

heave, To haul on a line or throw a line.

heaving line, A light line weighted at one end used for throwing between ships or to the dock.

heel, Generally, the opposite of the head. (The lower end of a mast) Also, **to heel** is to lay over from the pressure of the wind on the sails.

helm, The steering mechanism of a vessel.

helms alee, The command to the helmsman to turn the helm to bring the vessel into the wind.

hemp, Cordage made from the fiber of the hemp plant.

hitch, A knot by which one rope is joined to another or made fast to an object.

hockle, A twist or kink in a line.

hoist, To haul something up, particularly a sail, yard, or flag.

holiday, An area unintentionally left uncovered when painting or tarring.

hold, The compartment below deck where cargo is stowed.

hood, A canvas cover set up over a hatch or companionway to protect from the sun or rain.

horns, The jaws of booms; also, the ends of the crosstrees.

hounds, Shoulder attached to either side of a mast to support the trestletrees.

hull, The body of the ship.

I

inboard, Toward the center of a vessel from the sides.

inhaul, A line used to haul the peak or foot of the spanker into the mast.

in irons, When a sailboat loses headway and stalls while coming about with the wind directly ahead. Same as in stays.

in its gear, When a sail has been taken in and is being held by its buntlines, clewlines, and leechlines.

in its lifts, When the halyard has been eased and the yard hauled down so that the entire weight is supported by the fixed lifts.

in stays, When a sailboat's bow is into the wind while coming about. Same as in irons.

Irish pendant (pennants), Loose lines or twine hanging from the rigging.

J

jackstay, A metal rod attached across the top of a yard by eyebrackets that a square sail is bent onto and, also acts as a hand hold for the crew working aloft.

Jacob's ladder, A rope ladder having wooden steps.

jib, A triangular sail set on the forestays to the jib boom.

jib boom, A wooden spar attached to the top of and, extending out beyond, the bowsprit to which the forestays and the tack of the jib are attached.

jib boom guy (outer, inner), A wire rope leading from the jib boom to either side of the bow giving lateral support to the jib-boom.

jigger, A light tackle consisting of two blocks used as a general-purpose tackle.

jury rig, Implies a substitute or temporary item.

K

keel, The lowest longitudinal structure of a hull running the length of the vessel.

keelson, An internal stringer attached to the top and running the length of the keel.

king spoke, The spoke on the ships wheel which is uppermost when the helm is amid-ships.

knock down, To roll a ship over with the masts and sails in the water but not fully capsized.

L

ladder, A ship's stairs.

lamp locker, Where the various ship's lights, lanterns, etc., were stored. Located on each side of the ship aft of the fo'c's'le on the main deck.

laid, In rope making, the way the twist of the rope is set.

lanyard, (1) A short length of line or twine that is attached to tools and equipment to keep them from falling to the deck or overboard. (2) Ropes rove through deadeyes for setting up shrouds and backstays.

lay, The twist of a stranded rope.

lay aloft, The command for the crew to climb into the rigging.

lay to the waist, Command given when crew is to go to the area on the main deck between the main mast and the poop.

leading part, The part of a tackle that is hauled upon.

lee, (1) The side opposite of the direction of the wind (protected side).

leech, (1) The back edge of a fore-and-aft sail. (2) The outer edges of a square sail.

leech line, The line used for hauling up the leech of a square sail to the yard.

leeward, Toward the direction away from which the wind is blowing.

let fall, To push a sail off the forward side of a yard into its gear.

let fly, The command to immediately free a line.

let go and haul, The order given to brace around the yards of the foremast while tacking a square-rigged ship.

lifting, When a sail starts flapping like a flag or backwinds. Same as luffing.

lifts, (1) Fixed - Ropes extending from the yards to the mastheads used to support the yard in its lowered position (2) Moveable - Line used to cockbill the yards.

lines, The multi-strand laid cordage used in the running rigging and miscellaneous uses.

lizard, A short length of line with a thimble at one end through which a line can be rove to act as a fairlead.

long splice, Joining two lines in such a way that the final splice is no thicker than the original line.

loose, To cast loose the gaskets of a furled sail to put the sail in its gear.

luff, The leading edge of a fore-and-aft sail.

luffing, The shake or slat of a sail when the sheet is too slack or the vessel is too close to the wind.

M

make fast, To belay a line.

main deck, The principal deck, the full length of the ship, from which the ship is "worked".

mainmast, (1) The second mast from the bow of a ship. (2) The lowest section of mast on the mainmast.

mainsail, The lowest square sail on the mainmast.

mainsail haul, The order given to brace around the yards of the mainmast while tacking a square-rigger.

mainsheet, The line attached to the clew of the mainsail used to control the sail aft of the mast.

mainstay, A stay extending from the top of the mainmast, forward to the foot of the foremast.

mainyard, The lowest yard on the mainmast on which the mainsail is attached.

marl, To put on a serving that secures the worming and parceling of a rope.

marline, Small, light, two-strand line used for a variety of purposes.

marlinespike, A steel spike, pointed at one end, used to separate the lays when splicing.

marry, Twist two or more lines together so that the friction between them will prevent the lines from running free.

martingale, The stay which runs downward from the end of the jib boom to the dolphin striker and ending at the stem of the ship.

mast, The vertical spar on which the yards, boom, or gaff are attached. The *Star of India* has a fore, main, and mizzen mast.

midship, The middle of the ship between the bow and the stern and between port and starboard.

miss stays, To fail coming about from one tack to another.

mitre seam, The center seam where two sections of a sail are sewn together on a triangular sail.

mizzen gaff-topsail, A triangular fore-and-aft sail set on the mizzenmast above the spanker.

mizzenmast, The after-most mast on the *Star of India.*

mizzen staysail, The triangular fore-and-aft sail bent on to the stay leading from the base of the main mast to the doubling of the mizzen and mizzen topmast.

mizzen topmast, The section of the mast located directly above the mizzenmast.

monkey's fist, A knot enclosing a weight used on the end of a heaving line.

mooring lines, Ropes used to secure the ship to a pier.

mouse, To stop an opening as in the jaws of a hook by passing marlin or such material across the jaws to keep rigging from jumping out of the opening.

N

near, Close to the wind.

nock, The point on the luff of the gaff topsail where it is permanently attached to the mast.

O

oakum, Tarred hemp and manila used for caulking the seams of the decks.

off the wind, Sailing with the wind coming from broad off the bow.

on the quarter, The wind coming from aft of the beam.

on the wind, Sailing into the wind as close as possible.

orlop, The lowest deck of a ship.

outboard, Toward the side of a ship.

outer jib, The jib bent on the outer topmast stay in front of the inner jib.

outhaul, A line by which a sail is hauled outboard along a spar.

overhaul, (1) To increase the distance between the blocks of a purchase by easing the running line through the block. (2) slacking the buntlines and leechlines.

P

padeye, Steel ring attached to the deck or bulkhead to which gear is rigged.

painter, A length of small line used for securing a boat alongside a pier or dock.

parcel, To wind strips of tarred canvas round a rope after it has been wormed and before serving.

parrel, A collar around a mast and attached to a yard allowing the yard to be braced around and raised.

partners, The framework that supports the mast by the deck.

pawl, A metal dog at the bottom of the barrel of a capstan which prevents the capstan from turning back. Or a metal plate which prevents an object from moving.

pay out, To let out chain or ease off on a line.

peak, The upper outer corner of the spanker.

pendant, A length of rope or wire used to transmit the power of a purchase to where the standing portion of the pendant is attached.

pin rail, The railing on the inside top edge of the bulwark where the belaying pins and bitts are located. Also the rail on the sides of the poop.

pintle, A metal pin attached to the leading edge of a rudder that drops into a gudgeon on a boats stern for hanging a rudder.

plimsoll line, Markings on the side of a ship indicating the safe limit of cargo which may be loaded. Also known as the "Lloyds Mark"

poop, The raised deck over the aft portion of a vessel.

port, The left side of a vessel when facing forward.

port tack, Sailing with the wind coming from the port (left) side of the vessel.

preventer, A tackle rigged to back up any rigging.

pump wheels, The flywheels, turned by cranks, which operated the pumps which cleared any water from the bilges (bottom 0f the ship).

purchase, A block and tackle used to gain a mechanical advantage by increasing the power.

Q

quarter, A reference point referring to the side of a vessel between amidships and the stern.

quarter-block, A block set under a yard close to the mast that the clews and sheets are rove through.

R

ratlines, Horizontal lines running across the shrouds that are used as a ladder.

ready about, The order to prepare to tack the ship.

reef knot, A square knot formed in which the ends always fall inline with the outer parts.

reeve, To pass a line through the throat of a block or a fair lead.

rigging, Lines securing masts and sails.

rise tacks and sheets, The command to clew up the foresail and mainsail into their gear.

roach, The curve in the foot of a square sail.

roband, Short small line used to attach the head of a square sail to the jackstay or the luff of a fore-and-aft sail to the hanks.

royal, The sail and yard directly above the topgallant. The fifth sail and yard up from the deck on a mast.

rope, Cordage that is over one inch in diameter, whether made from natural or man-made fibers or wire.

running rigging, The moveable lines and blocks used for handling sails and yards.

S

sail locker, Where extra sails were stored.

Samson post, Strong post for fastening the rigging. The post at the fife rail just aft of the main mast that contain sheaves so that a line could be run through and hauled horizontally by a number of hands rather than being pulled straight down.

scallops, Slack sections of the luff of a fore-and-aft sail caused by not properly hauling on the halyard when setting the sail.

scandalize, To cockbill the yards on the foremast and mainmast to honor the death of a crewmember.

scupper, A drain hole in the bulwarks on the waterways to allow water on deck to drain away.

seize, To bind with small stuff one line to another, or the end of a line to its own part to form an eye.

seizing, The cord or twine, known as small stuff, by which ropes are seized to each other.

serve, To wind small stuff around a line in order to prevent chafing.

serving mallet, A wooden hand mallet used to pass a serving round a rope.

shackle, A "U" shaped link with a removable pin used to connect lines and ropes to blocks or eyes.

shackle spike, A small metal rod, tapered to a blunt point used to loosen or tighten shackle pins.

sheave (shiv), A grooved revolving wheel in a block over which a line runs.

shear pole, A horizontal metal rod fitted at the base of the shrouds just above the deadeyes to keep any turns out of the shrouds while they are being set up.

sheet, A line attached to the clew of a sail used to haul the clew down.

sheet home, To haul on a sheet to pull the clew of a square sail down to the yard below.

short splice, A method of splicing two lines whereby the ends of the two lines are unlayed and then spliced together with the strands of one line alternating with the strands of the other.

shrouds, The standing (fixed) rigging from the mast to the sides of a vessel.

sister hooks, Flat hooks that when joined together form an eye. Used to shackle blocks to an eye.

skylight, For light and ventilation for the Saloon.

small stuff, Small cordage used for whipping and serving.

smartly, Snappy, quick.

smart bower, The anchor on the port side of the ship.

snatch block, A block with a single sheave which has a hinged opening above the sheave to allow the bight of a rope to be dropped in.

snub a line, To quickly stop a running line by passing it round a pin, cleat, or bollard.

spanker, The large fore-and-aft sail bent onto the mizzenmast.

spanker boom, A spar to hold the foot (bottom) of the spanker.

spar, A general term for any wooden or metal pole used in the rigging of a ship which includes masts, yards, booms, and gaffs.

spider band, A metal band with cleats fitted around a mast for securing running rigging.

spill, To take the wind out of a sail.

splice, To join two lines, or make an eye in the end of a line, by interweaving the parts of the line.

spreader, An extension projecting horizontally at the crosstrees to spread the backstays.

spectacle iron, Two or three thimbles cast in a single mold so that two or three lines may be hooked into it to lead in different directions.

spring line, A dock line from the bow leading aft or from the stern leading forward which prevents the ship from moving fore or aft.

stacked, When the yards are positioned one right above the other.

standing part (of a line or tackle), That part which is made fast, not the part that is hauled upon.

standing rigging, The fixed and permanent rigging of a ship used to hold up the mast.

starboard, The right side of a ship when facing toward the bow.

starboard tack, Sailing with the wind coming from the starboard side of the ship.

stays, Standing rigging used to support spars.

staysail, A triangular fore-and-aft sail set from a stay.

steering gear, The ship's wheel and mechanical devices for turning the rudder. The helmsman stood aft (in back) of and at one side of the wheel, looking forward.

stem, The extreme leading edge of a ship's hull.

stern, The after end of a ship's hull.

stirrups, The short lengths of rope hanging from a yard through which the footropes are rove.

stopper, A short length of line secured at one end with the opposite end "stopping" a line from running with a hitch.

stopper hitch, A rolling hitch in which the second turn rides over the first.

strike, To take down.

strong back, Large timber mounted in the middle of the cargo hatch that supports the hatch covers.

strop, An eye spliced into a line for use round the cheeks of a block. Also, a line with an eye at each end used for lifting.

swallow, The opening in a block between the block and sheave through which the line is rove.

sway, A method of hauling on a line that is under strain by pulling the line toward you then down while another crewman hauls in the slack that was created.

sweat, To haul up tight.

swifter, The forward most shroud of the lower masts.

swivel block, Any type of block that has a swivel for a base.

T

tabling, A hem sewn along a sail's border to which the boltrope is sewed.

tack, (1) To bring a square-rigged ship around to a new course by bringing the wind across the bow (2) The line leading forward from the clew of the courses that opposes the sheet on a square-rigged ship.

tack jigger, A tackle used to haul down the weather tack of the foresail and mainsail.

tackle (tayckle), A purchase in which two or more blocks are used in order to multiply the power exerted on a rope.

taffrail, The rail around the ship's stern.

tailing, Keeping a steady pressure on a line coming off a sway hook, capstan, or block.

take a strain, When all the slack in a line is pulled in and an individual begins to exert pressure on the line.

take a turn, Passing a line around a pin to keep it fast.

taut, Tight, snug, no slack.

tend a line, To control a line that is running.

that's well, A command used to indicate a line has been hauled enough.

thimble, A metal ring fitted in the center of an eye splice.

throw off, To take a line off a pin and see that the line runs freely.

timber ports, Located aft on the ‘tweendeck. For loading long timbers that could not come through the hatches. They were closed while at sea with the iron covers seen at either side.

timenoguy, A line led through the mizzen shrouds that is used to prevent the main braces from fouling when bracing.

throat, The forward upper corner of a four-sided fore-and-aft sail.

to windward, Heading into the direction of the wind.

top, The platform over the head of the lower mast (Fighting Tops).

topgallant mast, The third mast up from the deck above the topmast.

topgallant, The sail and yard directly above the upper topsail sail and yard. The fourth sail and yard up from the deck on a mast.

top-hamper, Weight aloft.

topmast, The second mast from the deck above the mainmast.

topping-lift, An adjustable line that supports the end of the boom.

topsail, One of two sails identified as the upper or lower topsail set above the mainsail or foresail.

trestletrees, Two timbers fixed horizontally fore-and-aft one on each side of the lower masthead used to support the crosstrees and the top.

truck, A circular piece of wood at the head of a mast for flag halyards.

truss, A heavy swivel with a horizontal and vertical pivot forming the center of motion for bracing a yard.

turning block, Any block that changes the direction of a line.

turtleback, The inward curving of the ship’s side around the poop. This is not a characteristic of all ships but was “in style” when the Euterpe was built.

‘tweendeck, The deck between the main deck and the orlop. Used for small cargo or passengers.

twine, Small light line used for whippings and servings.

two-blocked, When two blocks are drawn together.

two-fold purchase, A purchase using two double sheaved blocks.

tye chain, A chain attached to the middle of a yard, which passes through a sheave in the mast, which attaches to a halyard for raising and lowering a yard.

U

unfurl, To cast loose a sail by throwing off the gaskets.

up behind, A command to those holding a line to drop the line so that the line may be belayed.

V

vang, A line leading from the mizzen gaff to the deck to keep it steady when the spanker is not set.

W

waist, The main deck of the ship between the forecastle and the poop.

walk away with, The command to grasp a line with both hands and haul the line by walking with the line.

waterway, Gutter at the side of a ship's deck to carry water to the scuppers.

wear, To bring a square-rigged ship around to a new course by bringing the wind across the stern.

weather, On the side toward the wind.

weigh, To break the anchor off the seabed by raising it.

whip, A single rope rove through a single block used for hoisting articles.

whipping, To bind twine around the strands at the end of a rope to prevent them from unlaying or fraying.

widow makers, The sheet blocks for the headsails.

wythe (wife), A metal band round the yardarm that has eyes for attaching the lifts, braces, and the earring of the square sail.

windlass, The machinery for raising and lowering the anchors. The power for raising is obtained from the capstan on the fo'c's'le head, and it is geared so that either side can be operated separately. When the anchor chain goes out it just runs and there are brakes for controlling the speed. The iron pawls over the chain near the hawse pipes are stoppers and are used to hold the chain at any length, independent from the windlass.

windward, The direction from which the wind is blowing.

worm, To fill the space between the strands of laid rope with small stuff.

Y

yard, A large spar crossing a mast horizontally from which a square sail is set.

yardarm, The outer portion of a yard that extends beyond the lifts.

yoke, The U-shaped steel bar that is secured to the center of the yard and to the truss.

Appendix B

Description of Tacking a Ship

"With livelier weather of the Southern latitudes we were often exercised in tacking and wearing ship, and soon became a very well drilled company, sending the big three-sticker about in record time. The *Fuller* was lively in stays[1] and with our small crew required the smartest kind of work in handling.

With all hands, including the 'idlers,' that is, the carpenter, cook and cabin steward, we mustered twenty men forward, hardly a man-o'-war complement, but enough, when driven and directed by superior seamanship, to send the long braces clicking through the sheaves of the patent blocks with a merry chatter.

'Hands about ship!' meant all hands, and the cook at the foresheet, a time-honored station filled by the Celestial with all the importance in the world. It was all the work that Chow ever did on deck and the heathenish glee with which he would 'let go' at the proper time, added a certain zest to our movements, particularly as we always hoped to have a sea come over and douse him, which often happened.

At the order, 'Ready! Ready!' the gear of the main and cro'jik was thrown down from the pins, clear for running. The command 'Ease down the helm!' and the order 'Spanker boom amidships!' would quickly follow, the vessel running rapidly into the eye of the wind with everything shaking, and then flat aback.

'Rise tacks and sheets!' and the hands at the clew garnets would sway up on the courses, lifting them clear of the bulwarks. Then all hands would jump like monkeys to the main and cro'jik. braces, at the order, 'Weather main, lee cro'jik braces!' the Second Mate, and Chips, standing by to cast off on the other sides. By then, the wind being a point on the weather bow, would come the hearty warning, 'Haul taut!' and 'Now, boys, mainsail haul!' and the after yards, aback, with the wind on their weather leeches, would spin about, the gear running through the blocks like snakes afire, the men on deck pawing it in at the pins with feverish haste, belaying as the yards slammed back against the lee swifters on the other tack.

By that time the ship would be practically about, with head yards and headsails aiding in the work. As soon as the wind was on the bow, all hands would spring to the lee fore braces. 'Haul taut-let go and haul!' thundered the order from aft. Chow would let out a wild yell as he unhitched the foresheet, and around would go the head yards. Then with jib sheets shifted over and the spanker eased off, as the tacks were boarded and the sheets hauled aft, we would pause to get our breath amid the tangle of gear on deck .

'Steady out the bowlines-go below, watch below!' and as the watch below would leave the deck, the order 'Lay up the gear clear for running,' was the signal for the crowd on deck to get busy while the good ship raced away on the new tack with the wind six points on the bow, a bone in her teeth, and a half point of leeway showing in the wake."

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[1]A vessel is "in stays" when in the act of going about.

Taken from: Standard Seamanship for the Merchant Service by Felix Riesenberg, C.E., Second Edition, 1936.