DOWNLOAD PDF SEAMANSHIP PARTS OF THE SHIP

Chapter 1 : Seamanship:How to Tie the Most Useful Knot On Ship

it is a method of ship construction in which large, widely spaced transverse frames are used in conjunction with light,closely spaced longitudinal members keel the longitudinal structure along the centerline at the bottom of a vessel's hull.

Any direction between the beam and the stern. Loose; not secured to a stationary object. When any part of a vessel is resting on the bottom. A ship runs aground or goes aground. On the mast or in the rigging. Instrument for measuring wind velocity. A no-fluid or "dry" barometer, as distinguished from a mercurial barometer. That part of an anchor located between the crown and the fluke. Upright or nearly upright strength member of a davit. The act of plastering tallow into a recess in the bottom of a sounding lead; called arming the lead, and done for the purpose of bringing up a specimen of the bottom. Stop; cease; as Avast heaving. The act of sailing craft in repeatedly catching and losing the wind from her sails, so as to be unable to make headway. Extended to cover the "fits and starts" of a person who cannot make up his mind. Also the backing and going ahead of a ship in casting or turning in confined waters. Piece of standing rigging leading aft. Long strip of steel wedged against the edges of hatch tarpaulins to secure them. Strips of light wood inserted in the leech of a sail to prevent the leech from curling. Long removable wooden or steel members extending from the deck to the overhead, used in storerooms to keep equipment and stores from shifting. The act of making a hatch watertight by wedging the battens against the tarpaulins, or of wedging shut or dogging down any watertight opening. The overall width of a vessel. Often used to indicate that a vessel has taken an unusually large roll and was almost on her side. The fitting on a block to which the dead end of the fall is attached. The act of securing a line to a cleat, set of bitts, or any other fixed point. In connection with an order or announcement, expresses the idea of "to disregard," as "Belay that last order. That portion of the vessel along the waterline which, when the vessel rolls, is alternately above and below water. Line sewed around the edge of a sail, awning, or other canvas. A long, broken sea rolling in on a beach. The outermost boundary of a breaker area; also called the surf line. When walking away with a line or running a line in, to let go, return to the point from which the line is being hauled, take a new hold, and walk or run away again. SEE Walk away and Run away. The act of breaking through the surface and jumping out of the water. The act of a vessel being thrown broadside to the course by some force acting on the stern. Frequently used in guesswarps. Solid fencelike barrier along the edges of weather decks. A projecting beam supported only at one end. Piece across the top of a lower mast that steadies the butt of the topmast. A fore-and-aft hatch beam. The act of breaking loose. Pipe leading from the forecastle deck to the chain locker. Expresses the general idea of "to slow. Full; filled to the extreme limit. A device for belaying a line or wire, consisting essentially of a pair of projecting horns. The act of hoisting a flag to, or in, its highest position. Kink in an inner yarn of rope, forcing the yarn to the surface. Metal ring that steadies the base of a mast, or supports the upper end of a boom that is stowed upright. A winch that keeps a set constant tension on a wire, by automatically paying out and recovering slack. Rounded part of an anchor below the shank. A knot in the end of a line made by interlacing the strands. In plaited line, the highest part of a pair of strands. Determining position by direction and distance traveled from a known position. Cargo stowed on the weather decks. Throw an article overboard. Magnetic compass error caused by the magnetic properties of a vessel. It is expressed in degrees east or west. A square-sterned pulling boat that can be rigged for sail. The water space between adjacent piers or the space in a drydock. Keel-like projection between the main keel and the turn of the bilge; used to support the ship on blocks in a drydock. Wood, metal, or canvas upward extension of the forward bulwark on a bridge; serves as a windbreaker. One of the two 2-hour watches in a dogged to watch. A piling or a nest of piles off a pier or beach or off the entrance to a dock used for mooring. Seaworthy pulling boat similar to a whaleboat, developed in the fishing trade. The thwarts may be removed for nesting on deck. To lower quickly, as a sail. To put out quickly, as a fire or cigarette. Said of a vessel when her draft for ward is deeper than her draft aft. Said of a vessel when her draft aft is deeper than her draft forward. Any line, wire, or tackle that applies a downward pull. The vertical distance from keel to water line. A sling containing a pair of movable hooks; used for hoisting a drum, cask, or

barrel by its chines. Also called chine hooks. Square platform placed in a cargo net to protect cargo against crushing effect. Any material used to separate layers of cargo, create space for cargo ventilation, or insulate cargo against chafing. Usually refers, however, to cheap wood boarding used for those purposes. Length of line spliced into a cringle on a sail, awning, canvas dodger, etc. Used to bend corners to booms, masts, stanchions, or the like, or to bend down the ends of a reef band in reefing. That period when the tidal current is flowing from the land. The act of disposing a line, wire, or chain by laying it out in long, flat bights laid one alongside the other. One of the bights. Rail containing belaying pins. A broken end of wire protruding from a wire rope. Line of plates between the anchor windlass and the chain pipes and hawsepipes over which the anchor cable runs. Method of disposing a line by coiling it tightly flat on deck with the second coil inside the first, and so on. That period when a tidal current is flowing landward. General term for articles that will float if jettisoned. Floating debris left on the surface by a sunken ship. SEE Foot rope and Lifeline. Line by means of which the foot of a hammock is secured to a billet hook. The lowermost line of a set of lifelines also called footline. The line hanging in a bight beneath a yard, bowsprit, and jib boom. Piece of standing rigging leading forward. Anchor with chain wrapped about a fluke or the stock, or with some other encumbrance entangled about it. To sink as a result of filling or flooding. The act of preventing a tackle from overhauling by gripping in both hands the parts of the fall between the blocks. That portion of a vessel between the waterline and the main deck. To set up again. To veer on a cable or pull upon a backstay to shift the chafe from a particular spot. A prop or support. The point about which a lever turns. To roll up snugly and secure, as a sail or awning.

Chapter 2 : Basic Seamanship

8 Parts of the Ship Masts and Spars The brigantines each have two masts, the foremast and the www.nxgvision.com foremast is composed of two pieces, a lower mast and a pole topmast.

The Stockless Anchor This is by far the most popular anchor in general use today its principal parts are shown in Figure 2. Further rotation of the arms are prevented by the head meeting the shank, at the built-in stops. The head of the anchor is comprised of the flukes, the arms, and the crown which are manufactured from cast steel, whereas the shank is made of cast steel or forged iron. The hinge bolt and the shackle are made of forged iron. It is easily handled for all anchor operations, and made anchor beds used with the close stowing anchor obsolete. Holding power again varies depending on the nature of the bottom but, as a rule of thumb, it may be considered to be up to three times its own weight. Admiralty Cast Anchor Used extensively as a bower anchor for warships, this anchor, because of good holding properties, is becoming very popular with the merchant service Figure 2. With the increase in size of ships â€" the large tankers of today, for example â€" shipowners required an anchor with greater holding power. The AC Type 14, as it was called, was developed in the United Kingdom and has the required properties. Tests showed that it had more than twice the holding power of a conventional stockless anchor of the same weight. With such an obvious advantage, Lloyds Classification Society granted a 25 per cent reduction in regulation weight. The angle of the flukes is made possible by a similar operation as with the stockless anchor, in which a hinge pin passes through the shank in the crown of the anchor. Illustrated in Figure 2. It is generally used as a mooring anchor, especially for the smaller type of vessel. Holding power is again dependent on the type of ground that the Anchor Work anchor is bedding into but has been found to be very good. It also has extremely good resistance to drag. Like the Admiralty Pattern, it is difficult to stow. The design has been modified since its invention to incorporate a stock, and is often used as a mooring anchor Figure 2. The invention showed that the application of basic principles can sometimes improve on practical experience. Small-boat owners tend to have the choice of two anchors on the market, namely the Danforth and the CQR. Both anchors have reasonable holding power but the Danforth may have a tendency to drag whereas the CQR will not. For easier handling and stowing the Danforth would be more popular, but if it is decided to use an anchor for the job it was meant for, preference is generally given to the CQR. Danforth Anchor Generally accepted as a small-boat anchor, this anchor dominates the American boat market Figure 2. A stock passes through the head of the anchor, allowing it to be stowed easily in a similar manner to the stockless anchor. Holding power is about The anchor is of American design, and the idea of the stock being passed through the crown of the anchor as opposed to the top of the shank demonstrates a practical solution to the stowage problem. The stock in this position prevents the anchor being fouled on its own cable. The action of this anchor is similar to that of the stockless anchor, where the tripping palms catch and cause the flukes to be angled to the shank. With the Danforth anchor, the tripping palms are generally situated closer to the centre line of the anchor. Once tripped, the spade-shaped flukes will tend to dig into the bottom. The weight of any anchor for the purpose of the rules and regulations governing anchors and cables shall: Drop Test cast anchors Any part of an anchor over 15 cwt is subjected to a percussion test by being dropped both end on and side on from a height of 12 ft on to an iron or steel slab. After that, the piece must be slung and hammered all over by a 7 lb sledgehammer. A clear ring must be produced to show that no flaw has developed during the percussion test. Proof load â€"â€"â€" Tonne â€"â€"â€" This piece will be turned down to 2. The casting will be deemed sufficiently ductile if no fracture appears in the metal. All anchors are subject to the proof strain Table 2. Wrought iron, or forged steel anchors are not subjected to these tests as they are forged from red hot slab by hammering. All other anchors will also be annealed. The anchor will also bear the number of the certificate, together with letters indicating the certifying authority Figure 2. The certificate will show the following: Weight excluding stock in kilogrammes. Weight of stock in kilogrammes. Length of shank in millimetres. Length of arm in millimetres. Diameter of trend in millimetres. Proof load applied in tonnes. Identification of proving house, official mark and government mark. Number of test certificate. Number of tensile test machine. Weight of the head of the anchor. Number and date of drop test. The

manufacturer will provide three additional links for the purpose of the test. These three links will be subjected to a tensile breaking stress, and if this proves to be satisfactory, then the total length of the cable will be subjected to a tensile proof test, the tests being carried out on approved testing machines. If two successive links break, the cable is rejected. Before the test on chain cable is carried out, the supervisor will satisfy X.

Chapter 3 : Seamanship remains at the core of Naval Academy training

A navigator uses the ship's last known position and dead reckoning, based on the ship's logged compass course and speed, to calculate the current position. If the set and drift, due to tide and wind, can be determined, an estimated position can also be calculated.

There are several different branches of navigation, including but not limited to: Early navigators used pilotage, relying on local knowledge of land marks and coastal features, forcing all ships to stay close to shore. Nautical charts were developed to record new navigational and pilotage information for use by other navigators. The development of accurate systems for taking lines of position based on the measurement of stars and planets with the sextant allowed ships to navigate the open ocean without needing to see land marks. Later developments included the placing of lighthouses and buoys close to shore to act a marine signposts identifying ambiguous features, highlighting hazards and pointing to safe channels for ships approaching some part of a coast after a long sea voyage. The invention of the radio lead to radio beacons and radio direction finders providing accurate land-based fixes even hundreds of miles from shore. These were made obsolete by satellite navigation systems. If the set and drift, due to tide and wind, can be determined, an estimated position can also be calculated. Periodically, the navigator needs confirm the accuracy of the dead reckoning or estimated position calculations using position fixing techniques. This is done by correctly identifying reference points and measuring their bearings from the ship. Addition lines of position can be measured in order to validate the results taken against other reference points. This is known as a fix. Celestial navigation systems are based on observation of the positions of the Sun, Moon and stars relative to the observer and a known location. Anciently the home port was used as the known location, currently the Greenwich Meridian or Prime Meridian is used as the known location for celestial charts. Navigators could determine their latitude by measuring the angular altitude of Polaris any time that it was visible. Calculating the anticipated altitude of the sun for a given day and known position is done easily using Calculus. Local noon is easily determined by recording periodic readings of the altitude of the sun. Since periodic readings of the altitude will plot a sine wave, the maximum reading is the one used for local noon. Longitude is calculated as a time difference between the same celestial event at different locations. Noon was an easy event to observe. Local noon is determined while shooting the azimuth as described above. The time of the maximum altitude is easily determined by interpolating between periodic readings. The time of noon at the known location is carried by the navigator on an accurate clock. Then the local time of local noon is observed by the navigator. The difference of longitude is determined knowing that the sun moves to the west at 15 degrees per hour. The need for accurate navigation led to the development of progressively more accurate clocks. Once accurate clocks were available, detailed tables for celestial bodies were created so that navigational activities could take place anytime during the day or night, rather than at noon. In modern celestial navigation, a nautical almanac and trigonometric sight-reduction tables permit navigators to measure the Sun, Moon, visible planets or any of 57 navigational stars at any time of day or night. From a single sight, a time within a second and an estimated position, a position can be determined within a third of a mile. Conceptually, the angle to the celestial object establishes a ring of possible positions on the surface of the Earth. A second sighting on a different object establishes an intersecting ring. Usually the navigator knows his position well enough to pick which of the two intersections is the current position. The math required for sight reduction is simple addition and subtraction, if sight-reduction tables are available. The numerous celestial objects permit navigators to shoot through holes in clouds. Most navigation is performed with the sun and moon. Accurately knowing the time of an observation is important. Time is measured with a chronometer, a quartz watch or a short wave radio broadcast from an atomic clock. A quartz wristwatch normally keeps time within a half-second per day. If it is worn constantly, keeping it near body heat, its rate of drift can be measured with the radio, and by compensating for this drift, a navigator can keep time to better than a second per month. Traditionally, three chronometers are kept in gimbals in a dry room near the center of the ship, and used to set a watch for the actual sight, so that no chronometers are ever risked to the elements. Winding the chronometers was a crucial duty of the navigator.

The angle is measured with a special optical instrument called a "sextant. An arm moves a split image of the star relative to the split image of the horizon. Some sextants create an artificial horizon by reflecting a bubble. Inexpensive plastic sextants are available, though they have less accuracy than the more expensive metal models. The LORAN system is based on measuring the phase shift of radio waves sent simultaneously from a master and slave station. Signals from these two point establish a hyperbolic curve for possible positions. A third source along with dead-reckoning will generally resolve to a single position. GPS uses 3D trilateration based on measuring the time-of-flight of radio waves using the well-known speed of light to measure distance from at least three satelites. This can be accomplished using low cost quarts clocks because the satellites send time correction signals to the GPS receivers. Most sailors have always been able find absolute north from the stars, which currently rotate around Polaris, or by using a dual sundial called a diptych. When combined with a plumb bob, some diptychs could also determine latitude. Another early invention was the compass rose, a cross or painted panel of wood oriented with the pole star or diptych. This was placed in front of the helmsman. Most sailors could use this instrument to take sun sights, but master navigators knew that sightings of Polaris were far more accurate, because they were not subject to time-keeping errors involved in finding noon. These were often crucial trade secrets, because they enabled travel to lucrative ports. The above instruments were a powerful technology, and appear to have been the technique used by ancient Cretan bronze-age trading empire. Using these techniques, masters successfully sailed from the eastern Mediterranean to the south coast of the British Isles. Some time later, around , the magnetic compass was invented in China. This let masters continue sailing a course when the weather limited visibility of the sky. Around , metallurgy allowed construction of astrolabes graduated in degrees, which replaced the wooden latitude instruments for night use. Diptychs remained in use during the day, until shadowing astrolabes were constructed. After Isaac Newton published the Principia, navigation was transformed. Starting in , the entire world was measured using essentially modern latitude instruments and the best available clocks. In the sextant was invented and navigators rapidly replaced their astrolabes. A sextant uses mirrors to measure the altitude of celestial objects with regard to the horizon. Thus, its "pointer" is as long as the horizon is far away. Modern sextants measure to 0. At first, the best available "clocks" were the moons of Jupiter, and the calculated transits of selected stars by the moon. These methods were too complex to be used by any but skilled astronomers, but they sufficed to map most of the world. A number of scientific journals during this period were started especially to chronicle geography. Later, mechanical chronometers enabled navigation at sea and in the air using relatively unskilled procedures. In the late 19th century Nikola Tesla invented radio and direction-finding was quickly adapted to navigation. Up until it was commonplace for ships and aircraft to use radio direction-finding on commercial stations in order to locate islands and cities within the last several miles of error. This used time-of-flight of radio waves from antennas at known locations. It revolutionized navigation by permitting semiautomated equipment to locate geographic positions to less than a half mile. It was the first electronic navigation system to provide global coverage. Watchstanding Watchstanding, or watchkeeping, in nautical terms concerns the division of qualified personnel to operate a ship continuously around the clock. On a typical sea going vessel, be it naval or merchant, personnel keep watch on the bridge and over the running machinery. The generic bridge watchstanders are a lookout and an officer or mate who is responsible for the safe navigation of the ship. Safe navigation means keeping the vessel on track and away from dangers as well as collision avoidance from other shipping. An engineering specialist ensures that running machinery continues to operate within tolerances and depending on the vessel, this can also be accomplished from the bridge. A secondary function of watchkeeping is the ability to respond to emergencies, be it on own ship or involving other ocean users. Duration Watch durations will vary between vessels due to a number of reasons and restrictions. The traditional three-watch system from the days of sail where the ships company was divided into three and the day divided into six watches of four-hours duration, such that an individual would keep two four-hour watches each day separated by an eight-hour time for sleep or recreation. Ropework is commonly defined as the set of processes of making and repairing ropes; some, however, also include any other work that can be done with ropes, such as tying knots and splicing. Actually, only a few of the "ropes" on a boat are called ropes, most are called lines. Ropes or wires that hold up masts are collectively known as standing rigging and are called

shrouds or stays the stay connecting the top of the mast to the bow is called the forestay or headstay. Ropes or wires that control the sails are known collectively as running rigging or lines. Those that raise sails are called halyards while those that strike them are called downhauls. Ropes that adjust trim the sails are called sheets. These are often referred to using the name of the sail they control eg. Ropes used to tie the boat up when alongside are called docklines. Rosebud stopper knot 5. Matthew Walker knot 6. Turks head knot 8. Overhand knot, Figure-of-eight knot 9. Reef knot or Square knot Two half hitches There are some ropes:

Chapter 4 : Seamanship - Wikipedia

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So, for this reason, it is of utmost importance that rope work and seamanship are learned right from day one at sea. Some of the most important knots are discussed below Practice and get to know them. This should always be borne in mind as it may affect the safety of life and property at sea. Some definitions and terms A knot involves the use of only one rope and generally used to prevent the rope from unreeving. In addition, it provides hand holds. A bend is a method of temporarily joining two ropes or ends of two ropes together. It may also be used to join two ropes not at the ends. The above definitions are only a guideline and need not be adhered to strictly. It is also the leftover short piece of rope after making a knot, bend or a hitch. A rope is whipped at the end using twine so that the ends do not fray. Is used to end a knot or to bind two ropes by tying a twine to the standing part and the running end. Some important knots used at sea The Overhand Knot: This is the simplest of all knots and for this reason, it is hardly ever used on its own. It is usually used to start off another, more complicated knot. This knot may be used on a rope to give a good holding grip for hands. The Figure of Eight Knot: It is used most commonly as a stopper knot. This knot is generally used in the lifelines of the lifeboat davits as a foothold and also in the gripes of the boat. It may also be used to prevent the rope from unreeving from the block. The reef knot is only useful in simple applications. It is easy to tie and will not jam, so it is always easy to untie. It is used for binding rolled sails, tying packages and as a base for the shoe-bow. It can be used as a trustful knot on most occasions unless there is jerking on the line. The reef knot is used to join two ropes of equal size and which does not come under too much strain. It cannot be used to join two ropes of unequal size. It consists basically of 2 overhand knots but care must be taken when putting the knot that the ends are crossed in the opposite way each time, that is, left over right and right over left and vice versa. The bights should be lashed with the standing part. The Bowline is probably the most widely used knot. It is useful for making a temporary eye at the end of a rope, to be put around or through anything. An ordinary bowline used to make a running eye at the end of the rope. Bowline on the Bight: This is very useful to make a Bowline on a rope when both the ends are already secured. Some bends used at sea Bends are used to join 2 ropes temporarily. The end of the bend has to be seized with the standing part. The first hawser is made to form a loop. The double carrick bend â€" is similar to single carrick bend except a full round turn is taken across the first hawser at C before bringing back the end to A and seizing this to the standing part. This is used to tie a rope or hawser to a ring or an anchor and generally used in small fishing boats. An alternative to this bend is the Round Turn and Two half hitches. In this hitch, the running part is taken from inside the round turn. Some hitches used at sea Round Turn and two half hitches: This hitch will never jam and can be cast off quickly. Usually, it is used to tie a heavy load to a spar, ring or a shackle. It is also used to tie a hawser to the breeches buoy. This is one of the most common hitches used at sea. It can be made either with the end or with the bight of the rope. It is generally used to tie a rope to a spar or a railing. It tends to slip if pulled sideways. When this hitch is formed using a bight of the rope â€" a loop and a reverse loop are closed together and slipped over the object to be secured. This hitch is used to secure a hook or a marline spike into the bight of the line. For example, to pass a tool or a small pipe to a person working on a stage. Timber Hitch is a very simple hitch, used for tying the end of the rope to a spar or a bale either for hoisting or for dragging. A Timber Hitch and a Half Hitch: The timber hitch is made on one end and a half hitch towards the lifting end. This hitch is also used to bend a rope to a spar or to a larger rope. It is made by passing the end of the rope twice known as the riding turns around the spar â€" riding the second turn over the first and finishing with a half hitch on the other end. Hauling will be in the direction of the riding turns. When compared to the clove hitch it has an additional turn and used generally as a stopper for mooring ropes. They are not entirely reliable as they tend to slip. When the standing end is stressed it jams the bare end as the bare end is below the standing end. A single Blackwall Hitch is used when the rope and hook are of the same size and a Double Blackwall Hitch is

used when the sizes are different. It is used to shorten a sling or to make a temporary eye to attach a block or a hook. This knot is used to begin a back splice. When the Crown Knot is finished the three strands of the rope are left pointing back along the rope. This knot is seldom used on its own and is a basis for other complicated knots. To make a crown knot: Unlay the strands till the whip. Now you have 3 strands lets name them a, b and c. Whip the ends of each strand. Place strand an over strand b, strand b over strand c and strand c over strand a in this case strand c will enter the loop formed by strand a after placing the same over strand b. Tighten all the strands to form the crown knot. This knot is exactly the opposite of the Crown knot described earlier. When completed the knot leaves all the three strands of the rope in the original direction. Follow the same directions as for the Crown Knot except that the strands are laid under the adjacent strand instead of over it. This knot is used as a stopper knot to prevent the rope from unreeving and also used in other complex knots. Often in some type of knots, a combination of the above crown and the wall knot is used either as a Crown Knot over a Wall Knot or a Wall Knot over a Crown Knot. The Wall and Crown knot: This can be used for a lanyard to prevent unreeving. It is also used in manrope knot. The Crown and Wall knot: This knot is generally used to finish off seizing. The Man Rope Knot: Is a decorative knot made at the end of the man-ropes for the gangway and the pilot ladder to prevent the rope from unreeving. It is basically a combination of a wall and crown knot â€" The wall knot made first and then the crown knot keeping all the 3 strands of the rope loose and then following the strands once again around the wall and the crown knot. Once a second turn is taken around all the strands â€" the strands are pulled taut and the remaining strands cut off. This is a good heavy knot similar in looks to the man rope knot but made differently. It is made on the end of the heaving line to weigh the heaving line to carry against the wind when throwing. Unlike the crown, wall or the manrope knots â€" no unreeving of the rope is required. The rope is first coiled around the palm of the hand for 3 rounds. The second set of 3 coils of the rope is taken perpendicular to the first set and then the third set of 3 rounds are taken perpendicular to the second set but under the first set. Once the rope is coiled properly the running end lands up near the standing part. Then the knot is made taut and sometimes a piece of rag or oakum is kept in the hollow of the knot before making it taut to act like a heart. Do not put any heavy objects inside. The Heaving Line Knot: This knot is an alternative to the monkey fist and simpler and quicker to make. Make a big bight loop at the end of the rope approximately 1. Pass the end of the rope through the loop and haul on the standing part to make it taut. A stage is rigged on board ships for maintenance purposes. It is very important that the knot tied on the stage should be extremely secure and safe for persons to work on stage. There are 3 or 4 ways to tie a stage knot â€" the most popular 2 ways are shown:

Chapter 5 : Text-Book of Seamanship - Part 2

BASIC SEAMANSHIP At this stage in your Navy career, you're learning the strong parts of the boat's structure. Boats stowed at moor the ship's boat? BOAT.

Or by the Practical Rule for ascertaining the Strength of Rope. The square of half the circumference gives the breaking strain of the weakest plain-laid rope in tons, and is therefore a safe rule. No cordage should be subjected to a strain above one-third of its estimated strength. For ascertaining the Weight of Rope. Three-strand, plain-laid, thread yarn, tarred. Multiply the square of the circumference by the length in fathoms, and divide by 4. The divisor for hempen cables is 4. Consider the proportionate strength of chain and rope to be ten to one-using the diameter of the chain and the circumference of the rope. Half-inch chain may, therefore, replace five-inch rope. The absolute strength of chain, at the breaking point, may be found by dividing the square of the diameter in eighths, by 2. To find the Weight a Rope will lift when rove as a Tackle: Multiply the weight the rope will sustain by the number of parts at the movable block, and subtract one-fourth of product for resistance. To find the size of Rope when rove as a Tackle to Lift a given Weight: Divide the weight to be raised by the number of parts at the movable block to get the strain on a single part, add one-third of this for the increased strain due to friction, and reeve the rope of the corresponding strength. To find what Number of parts of a parts of a small Rope are equal to a large Rope: Divide the square of the circumference of the larger rope by the square of the circumference of the smaller, and the result will be the number of parts of the smaller equal to one part of the larger. Multiply the square of the circumference of a hemp rope by. The wire-rope referred to has a hemp heart. By multiplying the square of the circumference of a wire rope by 4. Split in halves the two ends of a rope-yarn, scrape them down with a knife, crotch and tie the two opposite ends; jam the tie and trim off the ends. An Over-hand Knot, Fig. Pass the end of a rope b over the standing part a and through the bight above c. Take the end of a rope a round the standing part b , under its own part d , and through the bight c. A Reef Knot, Fig. Make an overhand knot, as before directed, Fig. This knot is used in tying reef points and small stuff generally. A Bow-Line Knot, Fig. Take the end of the rope a , Fig. Take the end of a rope, Fig. Take the bight a in one hand, Fig. The best way to sling a man by a bow-line is to shorten up one of the lower bights, using the lower part as a seat and putting the arms through the part next above. A Prolonge Knot, Fig. A Bow-line Knot, formed with a bight to hook 32 into, as in Fig. Shove the bight through the ring-bolt, take a half hitch with the short end over the bight, then pass the short end through the bight. A handy knot when you wish to use a short end of a long coil. Unlay the end of a rope, Fig. To Crown this knot, Fig. Lay one of the ends over the top of the knot, Fig. This is called a Single Wall, and Single Crown. To Double-Wall this knot, Fig. Take one of the ends of the single crown, suppose the end b , bring it underneath the part of the first walling next to it, and push it up through the same bight d ; perform this operation with the other strands, pushing them up through two bights, and the knot will appear like Fig. To Double-Crown the same knot, Fig. Lay the strands by the sides of those in the single crown, pushing them through the same bights in the single crown, and down through the double walling; it will then be like Fig. The first walling must always be made against the lay of the rope: The ends are scraped down, tapered, marled, and served with spun yarn. This knot is often used for the ends of man-ropes, and hence frequently called a Man-rope Knot. This knot is made by separating the strands of a rope, Fig. Haul them taut, and they form the knot, Fig. The ends are cut off. This is a handsome knot for the end of a laniard, and is generally used for that purpose. A Single Matthew Walker. With strands 1 and 2 form a Wall knot, omitting strand 3 ; then with strand 3 dip down, round all parts, and come out next its 33 own part, Fig. Render the parts through, jam taut, lay up and whip the end, Fig. It should have a leather washer around its neck when exposed to chafe. A Single Diamond Knot, Fig. Unlay the end of a plain-laid rope for a considerable length, Fig. Put the end of strand 1 over strand 2 , and through the bight of strand 3 , as in the figure; then put the strand 2 over strand 3 , and through the bight formed by the strand 1 , and the end of 3 over 1 , and through the bight of 2. Haul these taut, lay the rope up again, and the knot will appear like Fig. A Double Diamond Knot, for the same purpose, Fig. With the strands opened out again, follow the lead of the single knot through two single bights, the ends coming out at

the top of the knot, and lead the last strand through two double bights. Lay the rope up again as before, to where the next knot is to be made, and it will appear like Fig. Unlay two ends of a rope, and place the two parts which are unlaid, together, Fig. Make a bight with the strand 1. Wall the six strands together, against the lay of the rope which being plain-laid must be done from the right hand to the left , exactly in the same manner that the single walling was made with three; putting the second over the first, the third over the second, the fourth over the third, the fifth over the fourth, the sixth over the fifth, and through the bight which was made by the first; haul them rather taut, and the single walling will appear like Fig. It must be then crowned, Fig. This knot, when double-walled, and crowned, is often used as a stopper knot, in the Merchant Service. This is made by double walling, without crowning, a three-stranded rope, against the lay, and stopping the ends together, as in the figure. The ends, if very short, are whipped without being stopped. The ends are whipped singly and cut off. A deck stopper has a laniard spliced around the neck of the knot, and a hook and thimble spliced in the other. When made of wire rope, a deck stopper is fitted as in Fig. Unlay the ends of two ropes, Fig. The ends are then opened out, tapered, marled down, and served with spun-yarn. This knot is used when a shroud is either shot or carried away. A French Shroud Knot. Place the ends of two ropes as before, Fig. Laying the ends on one side back upon their own part, single-wall the remaining ends around the bights of the other three and the standing part, and it will appear as in Fig. When hauled taut, it appears as in Fig. This knot is as secure as the other, and much neater. Hitching a Rope, Fig. Pass the end of a rope b round the standing part; bring it up through the bight, and seize it to the standing part at d. This is called a Half-hitch. Two of these, one above the other, Fig. Take the end part of a rope a round a spar or timber-head, lead it under and over the standing part b , pass several turns round its own part c , and it is done, Fig. Used for bending a hawser to the ring of an anchor. A Timber and Half-Hitch, Fig. A Blackwall Hitch, Fig: Form a bight c , Fig. Put this bight over the hook of a tackle, Fig. This is sometimes used with a laniard, when setting up the shrouds. A Double Black-wall Hitch, Fig. Under a heavy strain a blackwall hitch is likely to carry away or slip, so that a Bill hitch, Fig. This is simply a marlinspike hitch [see below], with the hook thrust into the bight, the bight shoved well up on the hook. It is still better, however, to use a strap when a heavy strain is expected. Lay the end of a rope a , Fig. Through these put the hook of a tackle, Fig. A Sheep Shank, Fig. A Rolling Hitch, Fig. With the end of a rope a , Fig.

Chapter 6 : Text-Book of Seamanship

Navigation Navigation is the art and science of safely and efficiently directing the movements of a vessel from one point to another. Piloting uses water depth and visible references, while dead reckoning uses courses and distances from the last known position. Nautical navigation in western nations, like air navigation , is based on the nautical mile. Celestial navigation involves taking sights by sextant on the planets, moon, stars, sun and using the data with a nautical almanac and sight reduction tables to determine positions. Accurate time information is also needed. After nautical dusk , navigation at sea referencing the horizon is no longer possible, and after nautical dawn such navigation again becomes possible. A fundamental skill of professional seamanship is being able to maneuver a vessel with accuracy and precision. Unlike vehicles on land, a ship afloat is subject to the movements of the air around it and the water in which it floats. Another complicating factor is the mass of a ship that has to be accounted for when stopping and starting. Ship-handling is about arriving and departing a berth or buoy , maneuvering in confined channels and harbours and in proximity to other ships, whilst at all times navigating safely. Two other types of operations, berthing alongside another ship and replenishment at sea, are occasionally included. Fundamental to low-speed maneuvering is an understanding of the configuration and handedness of the propeller s. An effect known as propeller walk will kick the stern of the vessel to port or starboard depending on the configuration and the type of propeller when large variations on propeller rotation speed or changes of propeller rotation direction take place. In single-screw vessels where the rotation of the propeller is reversed on an astern bell, a standard was established that the propeller would turn clockwise when viewed from astern. This would mean that the propeller would turn counterclockwise when going astern and the stern would walk to port. This aided in docking operations, where "port side to" was the preferred situation and the vessel would be brought to the dock with a small bow-in angle and backing would flatten the angle, slow or stop the vessel and walk it alongside. An exception to this was the U. Sealift class tankers, which used a controllable-pitch propeller, where the pitch and not the direction of rotation was reversed to go astern. These propellers rotated counterclockwise at all times and so the "walk" was "normal". Other variations include what are known as bucket rudders such as the Kortz Nozzle where instead of a conventional rudder a pair of dish-shaped rudders, one either side of the propeller can be swivelled vertically to direct the propeller thrust through degrees. Thus to put the vessel into astern mode the rudder can be rotated through degrees without altering the speed and direction of the engine. Since with the conventional propeller or rudder configuration the propeller is designed to operate at maximum efficiency when going ahead, it produces far less thrust when going astern. But with the Kortz Nozzle, the ahead and astern thrust is the same. Other advantages of the nozzle are the ship can be steered astern which a conventional rudder cannot, and the ship can be steered fully under control to a standstill switching between ahead and astern mode to give complete control over speed. Most commercial vessels in excess of size limits determined by local authorities are handled in confined areas by a marine or maritime pilot. Marine pilots are seafarers with extensive seafaring experience and are usually qualified master mariners who have been trained as expert ship-handlers. These pilots are conversant with all types of vessel and propulsion systems, as well as handling ships of all sizes in all weather and tidal conditions. They are also experts in the geographical areas they work. However this should never be done lightly. In situations where the pilot is an "advisor" even though he has the con , the pilot or his "Association" have no responsibility or liability in the case of an accident. In some countries and areas e. Scandinavia and the U. However, in practice, they are likely to have the conduct of the vessel, especially on larger ships using tug boats to assist. The general rule of thumb is that a pilot assumes command of a vessel and is not classed as "an advisor" in the Panama Canal, crossing the sill of a drydock , or in any port in Russia or, perhaps, all the old Soviet states. This distinction is important because when a pilot is in command, the master can not take any action, but is limited to advising the pilot on any circumstance that creates what he considers a dangerous situation.

Progression in seamanship[edit] An able-bodied seaman climbs a kingpost to perform maintenance aboard a general cargo ship or freighter. In the days before mechanical propulsion, an able seaman was expected to be able to "hand, and reef, and steer". Training is more formal in modern merchant marines and navies, but still covers the basics. The crew of a large ship will typically be organized into "divisions" or "departments", each with its own specialty. For example, the deck division would be responsible for boat handling and general maintenance, while the engineering division would be responsible for propulsion and other mechanical systems. Crew start on the most basic duties and as they gain experience and expertise advance within their area. Crew who have gained proficiency become "able seamen", "petty officers", "rated", or "mates" depending on the organization to which they belong. On smaller commercial craft, there is little or no specialization. Deck crew perform all boat handling functions. The officers of the ship are responsible for navigation, communication, and watch supervision. Captains must pass formal examinations to demonstrate their knowledge. These examinations have a progression based on the size and complexity of the craft.

Chapter 7 : Seamanship Techniques - PDF Free Download

SEAMANSHIP TRAINING MANUAL. These notes are produced to assist both Staff and Cadets with Seamanship Training, to. PRINCIPAL PARTS OF A SHIP

Sometimes vessels are built in docks, which are artificial basins with level floors, shut off from outside waters by gates or by a single dam known as a caisson. These gates are water-tight and can be opened or closed; the dock is supplied with means for pumping out the water or letting it in. The lowest fore and aft piece which forms the foundation of a ship is called the keel Plate 1, No. It is of live-oak, or elm, and made of several pieces, the joints of which are known as scarphs. To receive the edge of the first row, or strake, of outside planking, called the garboard strake 2 , the keel is scored throughout its length, the score being styled a rabbet 3. To protect the main keel from injury in grounding there is fitted under it a false keel 4 , bolted on after the bolts which secure the frames to the main keel are clinched. The forward end of the ship is formed of the stem 5 , usually of live-oak, and inclining forward from the keel. A rabbet, similar to the one scored in the keel, is cut into the sides of the stem and receives the forward ends of the outside planking, which are called the fore hood-ends. The stem is backed and strengthened by the apron 6 , placed abaft it, and by the deadwood 7. Deadwood consists of timbers that fill the spaces where, owing to the shape of the vessel, the floor-timbers have to be discontinued. Inside of the forward deadwood and the apron is the stemson 8 , a large knee which joins the apron to the upper part of the deadwood. The after-end of the ship is bounded by the stern-post 9 , usually of live-oak, which stands perpendicular to the keel or slightly inclined aft. It is fitted like the stem with a rabbet on each side to receive the after-ends of the outside planking, or after-hoods, and it is strengthened by the introduction of a stern-post knee 10 , inner post 11 , and the after-deadwood Above the latter is the after-deadwood knee The joining of the stern-post to the keel is effected by tenons and bolts. The frames 14 form the ribs of the ship. They stand mostly at right angles to the keel and each is formed of two parts joined together, each part being in itself made up of several pieces. The lowest portions of a square frame are called the floor-timbers; above these come the futtocks, then the long or short top-pieces. The starboard and port side of each frame form one continuous piece. Where, owing to the form of the ship, the frames do not stand at right angles to the keel, they are called cant frames. The following parts of the ship serve to secure the above-mentioned portions together and give the structure stiffness and strength; viz. The main keelson 18 is a fore and aft timber which is laid directly over the keel on the floor-timbers and may extend beyond the latter and over the deadwood, forward and aft. The keelson is bolted through frames, keel, and deadwood. There are usually additional keelsons at each side of the main keelson, known as sister keelsons There are also boiler or bilge keelsons to support the boilers Bilge-keels are exterior keels bolted on to the bottom of the ship on either side of and parallel to the main keel, and at some distance from the latter, to prevent rolling in vessels of certain form. To hold the two sides of the ship together in the forward and after ends, where the frames have no floor-timbers crossing the keel, owing to the form of the ship, there are worked in knee-shaped, horizontal timbers, either with a natural curve, or formed of two or more pieces backed by an iron or wooden knee. These curved supports, secured to either side of the ship, are termed breast-hooks 15 forward and stern-hooks 16 aft; when they support a deck they are called deck-hooks. The outer planking of a ship is formed of a number of oak planks of varying thickness, but nearly parallel when placed in position over the frames. To check marine growth on the bottom of vessels and the consequent decrease of speed, all wooden vessels of war are sheathed with copper from the keel to a point some distance above their line of flotation, or "water-line. This planking is not continuous, as in the case of outside planking, and in different parts of the ship is called by different names. It is known as the limber-strakes 21 nearest the keelson. These strakes extend along the bottom of the ship on either side of the 3 keelson. As the planking is carried up the side beyond the limber-strakes it is known as the ceiling 22 ; following it up higher we find projecting ledges, called shelf-pieces, or clamps, placed inside the frames to receive the deck-beams. The deck-beams 17 , extending from side to side of the ship, holding the sides together, form the support for the deck-planking. The beams are supported by posts or stanchions 23 in their centre, and by clamps at each end. They are joined to the sides of the ship by iron or

wooden knees, known as hanging 24 , lodging 25 , lap 26 , or dagger corruption of diagonal knees, from their positions and form. The waterways 27 are timbers set in the side over the tops of the deck-beams and bolted to these and to the frames at the side. Decks are of oak, teak, or yellow pine, and are spiked to each deck-beam over which they pass. Vessels owe much of their strength to the use of diagonal trusses or braces, of metal, secured inside of the frame-timbers and forming a net-work which binds the frames firmly together. To the above outline of the parts of the hull is appended a list of prominent interior fittings and of the terms used in describing them: At or near the stern of the ship. Usually a space in the after orlop of frigates, being a passageway to the different store-rooms on that deck. In or near the middle of the ship. A timber secured in rear of the stem to strengthen it at the joint of upper and lower stem-pieces. Where clothing-bags of crew are stored. Usually forward on the berth-deck or leading off of fore-passage. Stone or iron placed in the hold to bring the ship down to her proper line of flotation and give stability. Timbers that extend from side to side, supporting the decks. Clamps bolted to the bowsprit through which reeve the fore-topmast stays. A pin of wood or metal at the side of the vessel or on the masts, around which a rope is fastened or belayed. The thickest outside planking, extending from a little below the waterline to the lower gun-deck ports. The sleeping and mess-deck of the crew and officers of a ship. Pieces of timber on either side of the mast to which the trestle trees are secured. Blocks of wood shaped to receive the bottoms of boats, when hoisted in. Rounded blocks of wood filling the angle between the trestle-tree and the mast, to prevent chafing of the rigging against the former. Pieces of iron or other metal used in fastening parts of the ship together. A small hatchway, or the covering or companion of such an aperture. Iron rings secured to one yard or spar, to support another spar, which passes through the iron. Such are the studding-sail boom-irons on the lower and top-sail yards. The part of the stem on which the bowsprit rests. Usually situated in the after orlop. Where the rise of the forecastle towards the waste of the ship, ends. Commonly used to define the after side of a top-gallant forecastle. Where the rise of the poop towards the waist, ends. Commonly used in speaking of the forward end of the poop. Knees, or an assemblage of timbers, set in the bows of ships and secured on either side to the timbers of the bow. Through these ports are led the bridles of tow-lines or warps. A light structure extending across the ship above the spar-deck, to afford the officer of the deck or lookout a place for observation. Shutters used in closing hawse-pipes hawse-bucklers , or filling the circular opening of half-ports when there is no gun in the port port- bucklers. Partitions that divide off different parts of the ship. The sides of the ship above the upper deck. A projection of wood or iron from the bow or quarter, to give proper angle for the lead of the fore-tack or main-brace. The quarters of the commanding officer of a ship. On the gun-deck of a ship with flush spar-deck, or under the poop poop-cabin of a single-decked vessel or one having a poop in addition to a covered gun-deck. In the latter case the gun-deck cabin is usually occupied by a flag officer. At present understood to mean light platforms in the wings where spare rigging is stowed. Frames, forward and aft, which are not at right angles to the central fore and aft line of the vessel. A joint fitted over the heads of masts to support the next higher mast, which passes through a hole in the cap. A stout upright which supports the forward edge of the lower cap. A barrel of wood or metal that revolves horizontally on a spindle; is used with capstan-bars or moved round by steam to raise heavy weights, weigh anchor, etc. Short timbers running fore and aft, connecting the beams. Filling the seams of a ship with oakum or cotton. A large wooden cleat used for belaying. Portions of the inside planking of a ship. Lockers in the channels for the storage of wash-deck gear. Receptacles for the chain cables of the ship, usually forward of the main-mast in the main-hold. Iron linings of the holes through which the cables are led in passing from one deck to another. Ledges of plank projecting from the side to give additional spread to the lower shrouds. Pieces of timber bolted in the top-sides, with sheaves for fore and main sheets, after guys. Those for the fore and main sheets are known also as fore and main sheet "chocks. Pieces of wood with projecting arms, used for belaying ropes. A raised boundary to hatchways, to keep water from getting down, etc. A space below the after hatchway under the berth-deck; usually the forward end of the after passage. In its simplest form, an iron lever fitted below each chain-pipe, the chain is controlled when running out by being, jammed between the compressor arm and edge of the chain-pipe. The rounding of the stern over the run. Thwartship timbers supported by the bibbs and trestle-trees to sustain the frame of the top constitute the lower cross-trees. Top-mast cross-trees resting on the top-mast

trestle-trees, extend the top-gallant shrouds. A knee which is inclined diagonally, usually to clear a port.

Chapter 8 : Seamanship: How To Maintain A Ship Or Vessel, And Painting

The following parts of the ship serve to secure the above-mentioned portions together and give the structure stiffness and strength; viz., the keelsons, breast-hooks (15) and stern-hooks (16), outer and inner planking, beams (17) and diagonal braces.

The eyes of this rigging are made to fit the funnel exactly. A clump-block seized between the topgallant shrouds, below the eye, is for the topgallant lift. Pass the ends of the topgallant shrouds over the futtock staffs, and thence into the top, where they are to be set up with hearts. Do not clamp these shrouds into the horns of the cross-trees until swayed aloft, as it gives just so much more gear to overhaul. The mast can be steadied sufficiently, until fidded, by the fore and aft stay and back stays. Take the back stays to the channels, and reeve the fore and aft stay through its sheave in the jib-boom. Send up by means of the girt-line at the topmast cap the royal band, with the rigging fitted upon it as described in the previous chapter. Place the band on the mast-head, Fig. A small clump-block for the royal lift is seized in between the shroud and back stay, below the band. When the mast is fidded and the flying-jib-boom is rigged out and clamped see below , set up the stays, back stays and shrouds with jiggers, not forgetting to clamp the topgallant shrouds in the horns of the cross-trees before setting up. The Jib and Flying-Jib Stay reeve through the inner sheaves or holes in their respective booms. The Main Topgallant Stay reeves through a hole in the after-part of the fore-cap, setting up in the fore-top. During continued exercises in sending up and down topgallant-masts this stay is frequently led down to the deck, abaft the fore-mast. The Main Royal Stay reeves now through the after chock of the fore-topmast cross-trees, so that if the foretopgallant-mast goes the main royal-mast is not in danger. In sending up topgallant-masts the main can be stayed without waiting for the fore. Sets up in the fore-top. The Mizzen Topgallant Stay reeves over a small roller in the after-part of the main-cap. Sets up in the main-top. The Mizzen Royal Stay leads through a sheave in the after chock of the main-topmast trestle-trees, and down into the main-top. All these stays set up with hearts and laniards. Sway it on board with a span, as directed for the jib-boom, and rest it on the head-rail ready for going out. Hang the heel by a slip rope from the fore-topmast stays, reeve off the heel rope through a block secured to the jib-guy, through the sheave in the heel of the boom, securing the end to the neck of the wythe. Pull out on the heel rope and point the end of the flying-jib-boom through the wythe, with the shoulders clear of the jib-boom end. Put on the head of the flying-jib-boom, the band of iron fitted with eyes for the flying-jib guys on each side, and one eye underneath for the flying martingale. Reeve the end of the flying martingale through a sheave in the end of the dolphin striker, and the guys through the holes or thimbles at the whisker-boom ends. Reeve also the flying-jib and fore-royal stays in their respective sheaves, and under the cleats on the dolphin striker. Seize the foot ropes to the shackles for the flying-jib guys, stopping them out a short distance to the guys, and seize the inner ends when the boom is rigged out to the jib guys. Rig out, taking off the slip rope from the fore-topmast stays, clamp the heel to the side of the cap, unreeve the heel rope. Set up the flying-jib martingale, then the fore and aft stays, lastly the royal back stays, shrouds, and flying-jib guys. Observe that in staying all masts the stay is usually set up first and then the back-stays, if any, and lastly, the shrouds. Having towed the yard off to the ship, say on the port side with the starboard yard-arm forward, lash a large single block at the topmast-head, into a strap sufficiently long to permit it to hang clear of the trestle-trees. Hook the port pendant tackle also to a strap on the after-quarter, and man it and the hawser taken to the capstan , swaying the yard on board, which must be kept from canting aft against the mast by means of a purchase or guy leading from forward. Now cast off the hawser and tackle and prepare for rigging. It is customary to place the fore-topsail-yard in the port gangway for rigging, and the main-topsail-yard in the starboard. For detail of slings see Fig. Quarter Blocks are iron-strapped, with friction-rollers, shackled to bands on the quarters of the yard, underneath. In case of accident compelling the use of a rope strap, it should be single with lashing eyes. There should be separate bands and blocks for the clewlines, as shown in Fig. If not, the quarter block is either double for the topgallant sheet and topsail clewline, or treble, if the topsail reef tackle leads under the yard. Iron bands a few feet inside of the yard-arms, with an eye in the upper part to which the top burton may be hooked. Bolt for Bead-Earing,

Fig. A bolt on the forward side of the yard, just inside the shoulder and well up on the yard; or it may be an eye in the shoulder band. Backer for Head-Earing, Fig. For backer, see Fig. Jack Stays for bending are of rod iron, those for reefing, on the topsail yard, may be of wire rope, rove through staples abaft the bending jack-stay on the upper part of the yard, outer ends going over the yard-arm with eyes, the inner ends set up to each other in the slings by means of small eye-lashings. A rod iron jack-stay often replaces it. These are of hemp, fitted with an eye going over the yard-arm. They are wormed and the splice served. The neck of the splice lies a little abaft the top of the yard, so as to be clear of the topgallant sheets. Foot-ropes are fitted rove through the stirrups, and the ends taken abaft the mast when the yard is crossed , and secured to the opposite quarters on top, by means of an eye-lashing passed over the yard, round on the forward side, underneath, up, and back through the eye again, a sufficient number of times; after which two half hitches are taken around all parts to secure the end. This plan of fitting them is recommended, on account of the facility with which the men can get on and off the yard. Inner ends of foot-ropes omitted in Fig. Stirrups are fitted with an eye in the lower end no thimble , through which the foot-rope reeves and to which it is seized. The upper ends, fitted with small eyes, are seized to the jack-stay staples. These are spliced around a thimble on the pacific iron for that purpose, and the eye in the other end secured on top of the yard to the jack-stay, the length of the yardarm inside of the sheave hole, with a rose-seizing. It would be better, as is already done on some modern ships, to do away with the flemish horses by carrying out the foot-rope to the pacific iron, fitting the necessary extra stirrups. The bands are joined by a span, which is used for the purchase to hook in when sending the yard up and down. In case of an accident to the straps of tye-blocks, requiring them to be fitted with rope-straps, it is well to remember that two single straps are needed to make the block stand fair on the yard. A parrel fitted of wire rope is commonly used. Now that all this gear is differently fitted, a separate outboard foot-rope is superfluous, and is going out of use. Eyes are spliced into the ends of the two legs, and stout quarter seizings placed on both close to the eyes of the short leg. The long leg then passes around the quarter of the yard, half the diameter of the topmast from the centre, and secures to the short one by a rose-seizing on the upper after side. When the yard is crossed the remaining leg is passed on the opposite side and secured in the same manner. There are additional seizings through holes in the jaws to keep the parrel in place. In time these parrels will probably be replaced by an iron cylinder, sliding up and down the topmast, to which the topsail yard is secured by a truss similar to the one on the lower yard. This cylinder, or tub, keeps the yard well trussed to, and its lower edge is low enough to keep the yard off the cap. Iron-strapped, with friction-rollers, and shackle to the after-bolts in the shoulder-band, block sheave standing up and down. In case of accident to the strap or bolt, use a grommet strap around the yard, single strap around the block, the two straps connected by lock thimbles. Lifts are four-stranded, hemp, and blacked. Hook to the shoulder-band, reeve through lower sheave of a sister block seized in between the swifter and next shroud in the topmast rigging, just below the eyes, thence to the top, where they turn up through clump blocks. Set up with jiggers. Single, rope or iron-strapped, hook to the pacific iron with sister hooks. Not put in place until the studding sail gear is rove off. The lower end has a thimble spliced in, to which hooks the fly-block. Passing through the mast-head gin-blocks, they reeve through the tye-block on the yard from out, in, thence up through the topmast trestle-trees, and made fast around the mast-head. The heel of the topgallant-mast is scored out on purpose to admit the tye. Small ships have a single tye only, which in this case reeves through a sheave in the topmast, in stead of a gin-block. The length of the tyes should be such that the fly-blocks will be square with the lower cap when the yard is down. In former times nearly all of the above described fittings were of rope. Overhaul the top-burtons from aloft, and hook them to the yard-arms; as also a fore-and-aft tackle to the slings to keep the yard from chafing against the mast, as it goes up. Man the purchase and walk away, taking through the slack of the starboard-burton, keeping control of the port or lower yard-arm, and placing a mat under it to prevent injury to the deck. As soon as the upper yard-arm is well up and clear of the lower stay, commence crossing by keeping to the slack of the fore-and-aft tackle, hauling on the lower burton and starboard brace. Reeve the lifts through the sister-blocks, and as the yard rises above the lower cap, square it; bring to and pass the parrel. Reeve the tyes, hook the fly-block with the halliards rove, and take the strain from the burtons and purchase, which may now be unhooked, and the latter sent down, together with the fore-and-aft tackle. Observe, lastly,

to place a block of wood between the slings and lower cap, to keep the yard from bowing, in case the halliards should be slacked or let go; or, as sometimes practised in large ships, have a midship-lift fitted, of such a length as not to permit the yard to touch the cap. Of the many methods suggested for getting a lower yard on board, the following may be selected as the safest and most seamanlike: The yard is towed alongside, on the starboard side, with the port end forward. Top up the fish-boom, Fig. Swing the boom around to the starboard side with the usual forward and after guys. Should there be no sheave in the boom, as at A, lash a block at that point. Lash together two large single blocks, as at B and C. Reeve a pendant through A and B, securing the outboard end to the head of the boom, and take a turn with the other end of the pendant at the sheet bitts. Through the block C reeve a hawser, make fast to the bight above C the lower block of a treble purchase from the topmast-head. The other end of the hawser is secured at the slings of the yard, and stopped along the port yard-arm to the pacific iron, with rope stops. Protect the hammock rail where the yard is to be landed by blocking up in the netting above the level of the rail. When ready, tow the after starboard yard-arm out from the ship, keep it end on to the vessel with a guy from forward. Walk away with the treble purchase, and as the yard comes over the rail, cast off the stops in succession; the pendant easing the yard in to the mast. Use, in addition, a fore-and-aft tackle, and thwartship jiggers to assist in placing the yard across the nettings. These are two stout iron bands going around the yard, each side of and near the centre, and connected by an iron span, to which the slings are attached by means of the slip-hook, or "pelican" hook.

Chapter 9 : Ship&#;s Company | Basic Seamanship - Michigan Maritime Museum

The Job Corps was started in under the administration of President Johnson as a central part of his "War on Poverty. " It was designed to be a safe, residential job-training program.

The chafing-batten is shown on the forward side. The tressle-trees are in place. Just below the bibbs comes the band for the patent truss, and below it the futtock-band to which shackle the futtock-shrouds. The Topmast has the cross-trees and cap on. The forward part of the tressle-trees has a clamp. By opening this the sending up and down of the top-gallant masts is greatly facilitated. The eye-bolts under the tressle-trees are for the hanging-blocks for the head halliards. One gin-block, for topsail-tye, is represented in its place. It should be hooked to the eye of a strap fitting over the tressle-trees and between the doublings. In the forward part of topmast cap, are eye-bolts for the top-gallant top-block, and standing part of top-gallant mast-rope. Fitting over the topmast cap is an iron strap with a link in each end for block of topmast studding-sail halliards. The Lower Yard has in the centre a stout iron span, to which hook the slings. The two lower blocks are for the topsail-sheets. The two partly concealed are for the clew-garnets and hook on the forward quarter. On the after side of the yard is nailed a chafing-batten. Next outside is the quarter-iron for topmast studding-sail boom. Next comes an iron burton-strap. Outside of it is shown the eye-bolt for head-earing of the course. On the yard-arm are the brace and lift blocks, shackled to an iron band. Outside of all is the "pacific iron" on which fits the boom-iron. The bending-jackstay iron is seen on the top of the yard. The truss is shown in a separate figure. The transverse section of the mast P shows the method of joining the principal pieces of which a mast is made. The Topsail Yard, in two views, shows the jaws, tye-blocks, bending-jackstay, quarter-blocks for topgallant sheets and additional blocks, forward, for top-sail clew-lines. Over the topmast head is frequently fitted a rectangular funnel of metal with a projecting flange at the base to receive a quarter-round piece of wood, or bolster, upon. Round funnels are also fitted for the top-gallant and royal mast-heads, and on them are fitted the eyes of the top-gallant and royal rigging. Yard-Slings, Y, Plate 36, are of chain, in length twice that of their respective mast-heads; to which must be 83 added half the length of the forward lower cross-tree, that being the distance the yard should hang below the top. The upper section, i. The size of the chain necessarily depends on the weight it is required to support. They hook to the yard by the sling-hook, as represented in the plate. Preventer Slings for topsail yards, used when preparing for action, are made of chain and go around the mast-head. In the equipment of ships one of the modern applications of iron has been its use in constructing lower masts. An iron lower mast is made up of plates, each bent to form an arc of a circle, usually degrees, and connected at the edges and ends by through-riveted lap-joints or covering strips, the structure being usually stiffened by continuous interior T, or angle-irons. Iron masts are commonly made of the same diameter as the wooden masts they have replaced, and for large ships are generally lighter than wooden masts of the same dimensions. The iron lower masts used in the British navy are more expensive than wooden masts of the same dimensions, and are of nearly equal weight, but the advantages gained in strength and durability are such as to outweigh the consideration of expense. A, Plate 37, shows the section of an iron lower mast, in which there are four plates in the circumference, connected by double-riveted lap-joints, and stiffened by four continuous angle-irons worked upon the centre of each plate. B, Plate 37, shows the angle-iron stiffeners placed so that the edge riveting shall work in as fastenings in the stiffners. In order to stiffen masts still further, the flanges of the stiffening bars are often connected by braces or horizontal stays. These stays afford a means of climbing up inside the mast for the purpose of inspecting, cleaning and painting it. The stays are placed at intervals of from 4 to 6 feet. C, Plate 37, shows the earlier, and Fig. D the latest practice in the British service in strengthening the iron lower masts. E and F, Plate 37, show the mode of fitting wooden trestle-trees to an iron mast. As there are no shoulders at the hounds, special provision has to be made for supporting the trestle-trees, and this is accomplished by working a plate and a ring of angle-iron around the mast, and fitting plate-knees, k k, which correspond with the bibbs usually fitted below the trestle-trees of a wooden mast. The plan E 84 shows the spread of the knees and the arrangement of the plate and angle-iron below the trestle-tree. It is usual to work doubling plates upon the lower masts in the wake of the wedging decks. These plates give additional

rigidity in wake of the wedges, and also prevent corrosion in the mast-plate Itself. G, Plate 37, shows the ordinary mode of forming the heel of an iron lower mast. The end of the mast is dosed by a circular plate fitted against and connected with the outside plating. In the centre of this plate there is a square hole, around which the angle-iron frame a is fitted, the vertical flange of the angle-iron thus forming the sides of a mortice in the heel. When in place, the mast rests on a stepping plate, upon which is riveted a rectangular box-shaped frame of iron b, and the tenon thus formed fits into the mortice in the heel of the mast. A man-hole is usually cut a few feet from the lower end of an iron mast to give access to the interior and for ventilation; other openings are also made at various heights for the latter purpose. Iron and steel have also been used in the construction of topmasts, topgallant masts and yards, but in these spars the advantages resulting from the change from wood are not so great as in the case of lower masts. The details of construction for the lighter spars do not differ greatly in principle from those described for lower masts. The plating is usually flush-jointed, and the larger spars have angle-iron, or other interior stiffeners. In fitting out our men-of-war, advantage is taken of every facility which a navy-yard affords. The rigging is cut out by the draft furnished by the constructors, using the Equipment Book of Allowances as a guide. The masts are placed by the navy-yard sheers, and the hold stowed by regular stevedores. When the navy-yard sheers are used, the mast is brought down from the spar-shed and placed with its head toward the ship under the sheers, or masting-derrick, the garland lashed on and the main purchase toggled, the fall being taken to the capstan, or crab, built for the purpose. Convenience determines which mast is to be taken in first. After placing one mast, the ship is hauled ahead, or dropped astern, to bring the other partners plumb under the purchase. In the following outline of masting, the work is assumed to be done without the conveniences of a yard. To give the deck above a proper support, they must be wedged up. To Reeve the Parbuckle, Fig. The main parbuckle consists of a hawser of a suitable size-say 5-inch-which is middled and the ends rove through the spar deck ports, a few ports apart the distance depending on the length of the sheer legs , from out, in, leaving the bight outside. The sheer legs having been towed alongside, with their heads aft, pass the after end of the parbuckle down under the head of the first sheer leg, up over the gunwale to the opposite water-ways, where the end is snatched and led forward, having a long luff clapped on it, if found necessary. The forward end of the parbuckle is led in like manner, taking it under the heel of the sheer leg, and thence to the capstan. The Counter Parbuckles, a a, Fig. They are rove through the same ports, from in, out, leaving the centre bight inboard, and the two end bights hanging down inside to catch the sheer leg when it comes over the gunwale; the ends are led down through the gun deck ports and taken around spars lashed fore and aft in the ports, having hands to attend them to ease the sheer legs down. Have a stout spar laid across the gunwale well aft to rest the heads of the sheer legs on when on board. When ready, clap on the luff, man the bars, and "walk away. Now pull up on the main, and ease away on the counter parbuckle, land the heel on the deck, the head resting on the thwartship spar placed for the purpose, roll it over, lift the heel over the capstan and get it in its proper position for forming the sheers; a spar may be placed from the gunwale to the capstan, and the sheer leg got thence to the opposite water-ways. The second sheer leg is got on board in the same manner, and placed for lashing. Instead of using parbuckles, the sheer legs may be got on board by means of a pair of small sheers, raked over the taffrail. Fore and main topmasts or lower yards may be used for sheer legs; in the latter case, the yard-arms must be well strengthened, or fished and woolded, by lashing around them small spars, or made fishes of stout oak plank, using well-stretched rope, and tautening the lashes by wedges. The lashing around the spar is termed a woolding. The sheer legs being on board, cross their heads with the port leg uppermost if the masts are taken in on the starboard side , square the heels and spread them about two-thirds the breadth of beam at the mizzen partners, so that when spread out to their full extent, the sheer head lashings may be tautened. With the first end, pass a number of round turns, filling up the intervals between the figure-of-eight turns, pass frapping, or cross turns, and secure the two ends with a square knot. After passing the sheer head lashing, spread the heels and place them in the shoes. The shoes should be of stout oak plank, long enough to rest upon at least two of the spar deck beams. A saucer is cut out of the centre to rest the heel in, and on the forward and after side an eye-bolt is placed for lashing the heel to. There are eye-bolts in the forward and after ends, for hooking fore and aft shoe-tackles to, to aid in the transportation of the sheers. Lash the heel to the shoe temporarily. Hook the after heel tackles to straps around the heels and set

them taut, and, as an additional security, when raising the sheers, shift the forward heel tackles aft. Lash on the upper block of the main purchase, so that it will hang directly under the cross. It should be a large threefold block, strapped with two single straps and fitted with a large thimble, to hang by a lashing passing over the cross of the shear head. The straps of the main purchase blocks should be well parcelled and marled. The lower block is double-strapped, with eyes for toggling, Fig. Take the lower block of the main purchase to the bowsprit hole, and toggle it there with a suitable spar. Begin with the standing part and reeve it from forward, aft, through the side sheave of the upper block, beginning on the side opposite to that intended for taking in the masts; thence through the corresponding sheave in the lower block, and so on until rove full, when clove hitch it around one of the forks close to the lashing, and stop the end down to its own part. Snatch the fall in some convenient place near where the lower block has been toggled, and take it to the capstan. If apprehensive that the upper purchase block will slue in its strap, by the greatest strain coming on one side, the fall may be rove so as to lead from the centre sheave- but this brings a cross in the fall, and is, therefore, objectionable. The upper block of the small purchase is double, and lashes to the after fork so as to play clear of the main purchase. Lash a single block to each fork above the small purchase and reeve stout girtlines. For sheer-head guys, clove-hitch a couple of stout hawsers over the sheer head, leading two ends forward and two aft, and to each clap on a luff-upon-luff for convenience in setting up and easing off, without surging. Belly guys are put on in the same way, about one-third the distance down each leg, cleating the hitches to prevent slipping, and clapping on luffs. On each sheer leg just above the shoe, put good straps, and hook and set well taut a thwartship tackle to ease the strain on the water-ways; lastly, pass a bulwark lashing either to the bulwark, or to a stout toggle placed outside of the spar-deck ports. The main purchase fall, being led to the capstan, the heels temporarily lashed to the shoes, and the forward and after shoe and heel tackles, both hooked aft, to prevent the sheers from launching forward as the strain is brought on the main purchase; the thwart-ship heel tackle set well taut, and plenty of hands to take in the slack of forward guys, and others to attend after ones, man the capstan, and heave around, catching the sheers as they rise, by the thwartship spar. When nearly up and down, or at an angle of about eighty degrees with the spar deck, "avast heaving," lash the heels in the shoes securely, shift the forward heel and shoe tackles, cast off the bulwark lashings, and transport the sheers to just forward of the mizzen partners having previously wet the deck , by moving one leg at a time.