How To Build Your Caravel

by Howard Shirley

You will need: Scissors, glue (glue stick, or white "school" glue, or rubber cement).

Helpful items: Paperclips to hold parts together while drying, tape for internal parts, a craft knife (such as an X-acto® blade), a straight-edge or ruler, colored felt-tip markers to match the colors of the ship.

Print the Model. The model can be built with plain paper, but will not be very sturdy. I recommend printing the model on stiff white cardstock, which can be found at any office supply store.

Cut Out the Parts. Use scissors to cut around the edges of the various parts. You can do this all at once, or in stages. There are four main parts to the model, which are constructed in this order:
The Hull (made of the port side, the starboard side, and the keel)
The Stern
The Deck
The Forecastle
Additional parts are the forecastle support, the rudder, the masts, the bowsprit, the sails, the crow's nest and the flag.

Note: The black arrows point to places where the model will be folded, *not* places to cut.

Section Cutting Notes
The Hull: The caravel's hull is one big piece which includes the port side, starboard side and the base (which we'll call the keel). To start, use a pair of scissors to cut out the hull, following the outline of the ship. The two sides are attached to the keel; *do not cut these apart!* Please also note the special areas below:

> The Bow: You will notice several thin black lines which extend from the bows of the ship. These lines are decorative; you may trim away the part that sticks out past the bows. Do *not* trim away the two white tabs that extend from the port bow!
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> Front keel tabs: The bottom of each side has a series of small tabs that meet the curving front of the keel. These tabs should be left attached to each side, but not to the keel. Trim along the curved edge of the keel until you reach the spot pointed to by the red arrows (labeled "X"). Do this for both sides of the keel. Cut the tabs so that they are individual strips.
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> Rear keel tabs: The rear of the keel slopes inward, and has two long white tabs. These tabs should be left attached to the keel, not the sides. Trim along the thick black lines until you reach the point on either side where the keel meets the sides of the hull.

The Stern: You will need to cut a slit for the rudder. This is shown on the stern as a thin, black vertical line. You can use a craft knife to cut this slit. Be very careful, as such knives are very sharp; children should only use a craft knife under adult supervision. You may want to guide your cut against a straightedge.

The Deck: Each deck section is its own level; the foredeck (a shallow semicircle), the main deck (a long rectangle) and the quarterdeck (a narrow trapezoid). All three sections are attached to each other; do *not* cut them apart. The main deck is separated from the quarterdeck by the stern cabin wall (with an entrance and two ladders) and a section of railing. Please note that on either side of this railing are two tabs. These tabs should be left attached to the cabin wall, but cut away from the railing and the quarterdeck (the edges to be cut are slightly darker and marked "cut"). Note the triangular holes in each section of the deck; the masts will be inserted through these. Use a craft knife to cut them out.

The Forecastle: You may notice that the short edges of the railings on this piece may print slightly staggered; if so, trim these so they are straight. Be careful not to remove any tabs. You can cut the white rectangles and triangles out now, or wait until after the forecastle is glued together.

The Rudder, Forecastle Support, Mast, Browsprit and Sails: These should be fairly easy to cut. Be careful with any tabs.

The Crow's Nest: The two circles can be cut apart or left slightly touching. Cut away the white interior circle and the gaps. Once the circles are glued back-to-back, you may want to trim to make them even.

The Flag: Don't try to cut out the forked end of the flag until both sides have been glued together; this will help you produce a cleaner, even flag shape.

3. Folding & Gluing the Caravel

Building the Hull

The gunwales: Gunwales (or "gunnels") are the walls that ring the main deck of a ship. On the top of each hull section, where the main deck will be, is a strip three "planks" high with a long tab attached to it. Start with the port strip. Fold it double, inside the hull, along the line where it meets the rest of the hull. This will create an interior wall three planks high. Fold the tab out from the bottom of this wall to make a short horizontal shelf. Make this fold along the last thin black line. (The colored portion of the tab is there to help disguise any gaps that may occur as you build the caravel.) Glue the wall together and clamp with paperclips if necessary. *Do not glue down the tab.* Repeat with the starboard side.

The quarterdeck rail: The top of the quarterdeck (above the row of windows) has a railing on each side; this is called the taffrail. Fold the port railing double along the center line, so that there are three rows of the railing inside and outside of the vessel. Fold the tabs horizontal to support the deck. *Do not glue the railing yet; there are tabs on the stern that need to be in place first.* Repeat for the starboard side.

The hull sides: Fold up the port side of the hull where it meets the keel; the colored side of the keel will be facing down. Repeat for the starboard side.

Attach the rear keel tabs: Fold up the rear tabs along the side edges of the keel. Glue them to the inside of the port and starboard hull. You may want to attach tape on the inside as well to help hold them in place.

Create the bow: Fold the big tab on the port bow towards the inside of the ship. Curve the two bow sides together and glue this tab inside the starboard bow. Carefully line up the exterior "plank" marks so they meet at the bow. You may want to tape the tab to hold it in place. Next, bend the top portion of the bow inwards slightly, roughly just above the two small portholes on each side. Glue the tab on the port upper bow inside the starboard upper bow. Use a small paperclip or clamp to hold the upper bow together as it dries.

Attach the keel to the bow: Fold the little tabs on the bottom of the bows towards the inside of the ship. Bend the front of the keel up slightly to meet the edge of the hull sides. You may either glue the tabs to the inside of the keel, or fold them around its outer edge and glue them to the bottom of the keel. Choose whichever you think looks best. *The keel may not exactly match the curve of the bow; if it does not, simply trim away the edge of the keel until you are satisfied with the fit. If you trim too much, don't worry; the keel really isn't visible anyway.*
You may want to use tape to hold the tabs in place.

Set the hull aside.

Building the Stern

The quarterdeck rail: Like the hull, the stern section has a portion of the quarterdeck rail, or taffrail. Fold this double as you did the matching rails on the hull sides and glue together. Fold the tab attached to the top edge of the cabin horizontal; it will be used to support the quarterdeck.

The transom arc: Fold the top of the stern to create a nice clean crease at the base of the cabin area. The fold is made just where the vertical lighter-colored beams end, two "planks" below the cabin windows. Check to make certain this matches the cabin edge on the hull sides. Below this fold you will curl the stern piece to match the arc where the cabin overhangs the transom stern (see below),

Attaching the stern: Fold the tabs on the bottom and sides of the stern inward towards the blank side of the paper. Glue the bottom tab to the inside rear of the keel. Be certain to line up the bottom of the stern with the rear edge of the keel. Also make certain the edges of the stern line up with the rear edges of the hull sides. Note that because of

the arc curl you made in the previous step, the "plank" lines printed on the stern section may not match up evenly with the plank lines on the hull sides. This is unimportant, and really doesn't affect the look of the model.
Glue all the tabs (except the ones on the railing) to the inside of each hull side, being careful to match the curve of the arc. Tape in place if necessary. Insert the tabs on the stern taffrail inside the port and starboard rails and glue the rails double. Clip together to dry.

The rudder: Fold the rudder double along the center line and glue. Insert the rudder in the slot on the stern, with the wider side down against the keel. Make certain the white tab on the rudder is not visible from the outside. The slot should hold the rudder in place without gluing, but you can use a dab of glue to secure it if you like.

Building the Deck

The deck of your caravel consists of three sections. Running from bow to stern, they are the foredeck, the main deck, and the quarterdeck. In this caravel the foredeck is completely covered by a forecastle, which extends over the foredeck itself. Begin by folding and gluing this piece.

The forecastle: Fold the forecastle in half, exactly along the central line of the railing between the top and bottom triangles. The unprinted sides of the triangles should meet. Glue these together, as well as the folded railing. Fold up the tabs on the "Top" section of the forecastle, and coat both sides of these with glue. Fold the remaining two railing sections over these tabs, inserting the tabs on the edge of each railing inside the other railing where the corners meet. Glue the railings and tabs together; remember, all the tabs will be inside the railings; no tab should show. You should wind up with a little triangular tray, with the railing forming the walls of the tray. Set the forecastle aside.

Folding the deck sections: You will need to fold the deck in six places: at the top and bottom of the forward cabin wall (between the foredeck and the main deck), at the top and bottom of the aft cabin wall (between the main deck and the quarterdeck), at the center of the taffrail between the deck and quarterdeck, and at the base of the taffrail where it connects with the quarterdeck. The foredeck should be horizontal. The forward cabin should fold down from this, sloping outwards at roughly 45°. The main deck should also be horizontal, while the aft cabin wall is perfectly 90° vertical between the main deck and the quarterdeck. Fold the taffrail double above the cabin wall, then fold the quarterdeck 90° from the base of the rail. Fold the tabs to the inside of the cabin wall sections.

Attaching the deck to the hull: Begin by folding the little tabs on the top of the bow flat— they should be horizontal, as they will support the foredeck. Put glue on these tabs. Also put glue on the long horizontal tabs on either side of the hull. Next put glue on the tabs on the deck assembly; two on either side of the forward cabin wall, two on either side of the aft cabin wall. Set the deck inside the hull so that the foredeck and main deck rest on their support tabs Line the edges of the forward cabin wall and the aft cabin wall to match the edges of the hull, with the tabs inside the hull walls. Glue the taffrail above the aft cabin wall double. Lastly put glue on the quarterdeck supports on the hull assembly; you may want to fold these up slightly to help make certain the tabs stick to the underside of the quarterdeck. Gently press the quarterdeck flat onto these tabs and hold in place for a few seconds as the glue sets.

Attaching the forecastle: Put glue on the entire foredeck. Place the forecastle, railings up and long point forward, on top of the foredeck, lining up the rear rail with the top edge of the forward cabin wall. The corners of the rail should line up with the corners of the cabin wall, and the opening in the rails should be located above the two printed ladders. Be sure that you have also lined up the mast hole in the forecastle with the mast hole on the foredeck.

Fold and attach the forecastle support: Fold this piece along the central line, making a shallow angle. Fold the two side tabs in so they overlap. Put glue on these tabs. Carefully align the forecastle support under the forecastle, smaller end forward, so that the rear of the support butts as tightly as possible against the upper bow. You may want to experiment as to the best position and angle for the support before you glue it in place; if the tabs overlap the edges, just trim them slightly until you get a good fit, then glue everything in place.

This completes the hull and deck assembly! You are ready to add the masts, bowsprit, rudder and sails.

Building the Masts & Bowsprit

Scoring the folds: The masts and bowsprit are a very basic fold— they are simply long tubes with a triangular cross-section. However, because they are narrow and cardstock is stiff, they can be difficult to fold. I recommend scoring the masts and bowsprit on the inside before folding. First, flip each over so that the unprinted side is face up. Using a ruler and pencil, make three marks, evenly spaced, on each short edge.

Mainmast: 1/4” apart
Bowsprit, Mizzenmast & Foremast: 1/8” apart
Using a craft knife with a sharp point and a ruler as a guide, *lightly* run the point of the blade lengthwise down each mast and bowsprit, running from each mark to its corresponding mark on the other edge. Apply on a minimal amount of pressure; you do not want to cut the paper. This should leave a very faint scoring line opposite the line on the printed side. You will do this for each line; this will give you three scoring lines on each mast and bowsprit.

Folding & Gluing: Flip the paper over and fold with the printed side out along the long black lines. The scoring lines should make this fairly easy to do. Glue the edge that is part white, part brown underneath the opposite printed edge. (I”ve found that a very thin line of liquid white PVA glue, such as Elmer’s®, tends to hold better and more permanently than glue stick.) Gluing this is not easy, as the cardstock tends to push open when tightly folded as these are. You may need to work in sections, gluing and holding for a few seconds, then progressing along the mast, gluing and holding as you go. This process will likely result in masts with slight bends and even a somewhat uneven, dimpled appearance. Don’t worry about this. Masts from this time period were made from tree trunks, trimmed of branches and bark and mounted in place, and might not be perfectly straight or smooth. Some irregularity in your masts will simply capture the “natural” look of a 15th century caravel.

Note: Paper masts are included with this model so that it can be printed and built without needing extra parts. However, if you prefer, you can use bamboo skewers, chopsticks or small wood dowels as your masts. Simply trim these to a length that fits, and paint or color with felt markers to match the vessel.

Attaching the masts: Insert the masts into the holes in the forecastle/foredeck, main deck and quarterdeck. The foremast goes in the forecastle, the mainmast in the main deck, and the mizzen in the quarterdeck. Slide the masts down the holes until they hit the inside of the keel. (You may want to put a spot of glue on the bottom edges of the masts before inserting them into the deck holes; this will help hold them in place.

Attaching the bowsprit: Place the bowsprit on the forecastle, with one end butting against the foremast and the other extending over the forward point of the forecastle rail. The bowsprit should be edge down, with one flat side up. Note the point where the bowsprit rests against the rail; you may want to mark this spot faintly with a pencil. Remove the bowsprit.

Using a craft knife, make a very small notch in one edge of the bowsprit, about halfway between the forward tip of the bowsprit and the mark where it touched the railing. Be careful not to cut too deeply; you want the bowsprit to remain stiff. This notch will hold the spritsail in place below the bowsprit.

Now, place a small dab of glue on the mark, on the same edge as the notch. Place another dab of glue on the end of the bowsprit where it will meet the foremast. Set the bowsprit back in the forecastle as before, notch down, and hold in place to dry.

Preparing the Sails

Folding & gluing spars and sails.Your caravel has three square sails and one triangular lateen sail. One edge of each sail includes the brown spar, or yard, from which the sail hangs. Fold the yards double along the center line and glue together. You may want to score the back of the yard before folding just as you did the masts. Fold the main sail, foresail and mizzen sail just slightly forward from their yards. Gently curve all the sails so the “bow” outwards in the center.

Attaching the sails: Find the exact center of each yard. Put a dot of glue on the backside of the yard. Glue the foresail yard about a third of the way up on the front of the foremast. Glue the mainsail yard about a third of the way up the mainmast. Glue the lateen sail (the mizzen) yard halfway up the mizzen mast, with the yard at a 45° angle; the sail should form a right triangle, with one sail edge parallel to the quarterdeck , one sail edge parallel and above the stern, and the yard as the hypotenuse sloping down towards the main deck. Lastly, glue the spritsail in the notch underneath the bowsprit. You will need to hold each sail in place for a few seconds for each to stick; be careful not to jostle the boat while the glue dries, or the sails may fall off.

Building the Rudder, Crow's Nest & Flag

Folding and gluing the rudder: Fold the rudder double along the center line and glue together. Slide the rudder into the slot on the stern, with the wider end down. None of the white should be visible, and the base of the rudder should

be in line with the keel so that it sits flat against a table top. You may want to put a small amount of glue on the rudder tab before inserting it, but the slot should hold it in place for casual handling.

Folding & attaching the crow's nest: Glue the two sides of the crow's nest back-to-back. Trim the circle edges if they don't fully match. Overlapping the open ends of the circle so that you form a wide cone. The smaller circle should fit snugly around the mainmast. Glue the ends together. Put a small dot of glue on the small end of the cone and slide the nest carefully down the mainmast, with the large end up, until it meets the mainsail yard. Hold the cone straight while the glue sets.

Folding & attaching the flag: Wrap the flag double around the mainmast, with the center of the fold at the back of the mast. Glue the flag together and around the mast. If you may want to trim any edges that are uneven, glue the front of the flag together first, leaving the opening for the mast, removed the flag from the mast, trim, and then replace, gluing the open portion to the mast at this point. (I recommend waiting to cut the fork in the flag until after gluing it together.) With the flag in place, carefully curve it to produce a "wave" effect. Note that on a sailing vessel, the flag streams in the direction of the wind, not towards the rear of the vessel. The caravel design assumes the wind is more or coming from behind, so the flag points towards the bow.

Final Polish, Ship Shape & Bristol Fashion

To finish up the model, you may want to take felt-tip markers and color any exposed white edges. This is entirely up to you, but does help the appearance. Every captain likes a tidy looking ship!
Rigging (the "lines" or ropes on a ship) can be created using thick thread or thin string. Look up pictures of caravels on the Internet for inspiration.

Congratulations! Your caravel is complete, and you are read to sail in search of new lands!

About Your Model

Your caravel is flat so you can easily set it upon a table. This design is called a *waterline model*, as the tabletop represents the waterline for the ship, which is the point where the hull rises above the level of the water. A real ship extends below the surface, even though you can't easily see this from above. Although a waterline model doesn't show the whole ship, it's great for dioramas, pirate and navy games, imaginary play, or just displaying on a shelf without needing a base.

Your caravel has a "transom stern," meaning it has a flat stern or rear end. Most vessels of the 15th century were "double enders," meaning the bow and the stern were both curved, a shape which was easier to construct in those days. In paper, however, the transom is much easier to design and build. I also like the look, and 15th century transom vessels did exist.

The caravel was a versatile vessel, used for cargo, exploration, and war, and was the grandfather of the great sailing ships of the 16th, 17th, 18th and 19th centuries. Elements of caravel design (three or more masts, square rigging, multi-level upper deck, bowsprit, etc.) continued to be used for centuries, basically until the advent of powered vessels.

This caravel is based upon the replica ship *Matthew*, built to recreate the voyage of explorer John Cabot, discoverer of Newfoundland. The *Matthew* is a double-ender, but otherwise the model and the replica ship match very closely. I've included a version with similar colors to the *Matthew*, as well as English flag markings of the time. Find out more about the *Matthew* and John Cabot at www.matthew.co.uk.

If you happen to enjoy miniatures wargaming (as I do), the caravel will work well with figures ranging from 6mm to 15mm high. The main deck is designed to hold three 20mm x 40mm bases crosswise athwarts the ship—this is the standard size of a unit in the game Warmaster from Games Workshop. A cardstock caravel is stiff enough to support most models at these scales. And it's cheap enough to build a whole fleet!

I hope you enjoy building and playing with your model as much as I've enjoyed designing it. I've got my eye on other ships as well, so keep coming back to see what else may set sail from the shipyards. Thanks, and bon voyage!

--- Howard Shirley