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by ship modelers for ship modelers

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by Robert Hunt

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Table of Contents

Editorial

Well, here we are, already a month gone in 2023. You almost hate to close your eyes any more as time fly's by so quickly!

Some great articles in this months issue. First up is an interesting introduction article by Pat Majewski about the HMCSS *Victoria* from Australia. More will follow in next months issue about this colonial steam sloop.

Next up is an interesting article on lighting your model with LEDs. Arthur discusses the parts and methods of lighting your models. We've seen some very impressive looking models using LEDs over the past little while including the river boat on the cover of this issue.

This article is follow up in the Makerspace column where Mike Shanks discusses laser technology giving us a primer into laser cutters.

Makerspace is followed up by The Modelers Machines column. This is the first part of a two part series from Donnie Driscoll on milling machines. Donnie provides us with some of the basic information we need to know about milling machines. Very interesting read if you were wondering about them.

Then we get into an article by Robert Hunt on how to plank your hull. This is is a two part article as well. In this issue Robert covers laying down your first layer of planking for those models that require two layers (very common in todays kits).

Last but not the least in the Book Nook is a review of Rob Napiers recent book release at SeaWatch Books, *Caring for Ship models, A Narrative of Thought and Application*. This is a very interesting book and one I'm please to say is on my bookshelf and will no doubt be read many times over the years.

And of course we finish up this issue with Gene's Nautical Trivia section.

Enjoy the read!

Until next time

May you have fair winds and following seas

Winston Scoville

HMCSS *Victoria* (1855-1895)

Renowned for her beauty and utility throughout the mid and latter parts of nineteenth century Australasia, Her Majesty's Colonial Steam Sloop (HMCSS) *Victoria* has now been all but forgotten.

H.M. Colonial Steam Sloop Victoria

Ashbee & Dangerfield & Taylor, John D., & Ackermann and Co. 1864 – State Library of Victoria – Image H6503.
Copy of a purchased image from State Library of Victoria – Not in copyright.

Some debate has been centred on whether *Victoria* was, or was not, the first Australian warship. For the record, the first gunboat built in the Australian colonies, H.M. Colonial Gunboat *Spitfire* was launched on 4 April 1855 from Cuthbert's shipyard in Port Jackson, Sydney, New South Wales (NSW).[1] While the *Spitfire* was the first small gunboat built in Australia, the *Victoria* was seen as the first 'fighting ship' owned by a colony as there is some doubt that the *Spitfire* was ever armed:

> *It is to Victoria, however, that the distinction belongs of having owned what may fairly be called Australia's first fighting ship—the steam war sloop Victoria.*

Victoria was intended to provide naval defence for the Colony of Victoria, especially the protection of the huge gold reserves resulting from the gold discoveries of the early 1850s. Particularly, vulnerable, or so it was perceived by her inhabitants, was the flourishing city of Melbourne, with its doorstep on Port Phillip Bay and therefore vulnerable to seaborne attack. The rapidly growing city was the stronghold of, and the main shipping port for, gold bullion and species.

Also of great concern to the colony was the perceived threat of war with France[2] and later Russia,[3] or the possibility of well-armed privateers sailing into the Bay and holding the city to ransom under the weight of their guns. This was a powerful inducement for urgent improvements to the local military defences as the Home (British) Government appeared disinclined to provide additional naval assets for the Colony's protection.

The Colonial Victorian Government was therefore compelled to provide for their own defences. Along with a major effort to fortify Port Phillip Bay and its approaches, it was also apparent that urgent attention must be given to the purchase of a vessel to assist these defences. The Government additionally sought a general utility vessel to avoid the high costs of chartering vessels to undertake various maritime duties.

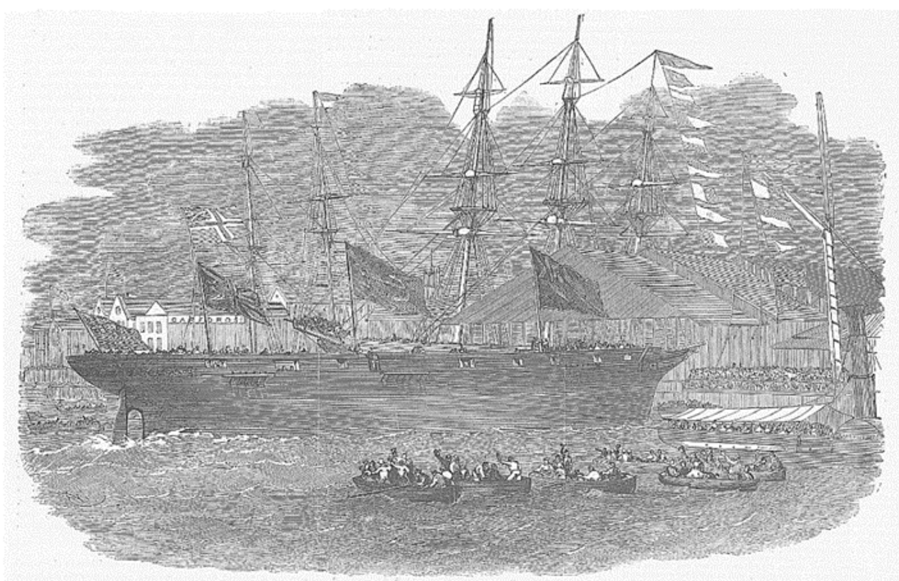
A steam-screw vessel, to be named *Victoria* was subsequently ordered by the Victorian Government in late 1854. The Governor for the Colony of Victoria at the time, Sir Charles Hotham, K.C.B. (a renowned naval officer), on the 21st of July 1854, appointed Commander N.L. Lockyer, Royal Navy (RN), as the ship's build superintendent and directed him to name the vessel *Victoria*. Hotham took a deep interest in the building of the vessel and directed some of the improvements to be incorporated in her design and fit.

Lady Constance Talbot

Image from the album 'Historic - Royalty, Nobility and more by Ofir Fried-man' (Geni)

The ship was designed by the preeminent naval architect, Oliver William Lang, then the master-shipwright of Woolwich Dockyard, as a one-off design. He agreed to design the vessel for no cost to the Colony on the proviso that he be given a free-hand in her design. This enabled him to include the most modern design practices and specify the best equipment and fittings then available.

The ship was built by Young, Son and Magnay at Limehouse Docks (Thames River) in London and was completed within 6 months of winning the Contract in mid-1855. The main engines, boilers and the auxiliary machinery were built by George Rennie and Co. at the adjacent 'Blackfriars Engineering'. The innovative feathering screw designed by Maudsley, Sons and Field was also built under licence by Rennie and Co. The vessel was delivered in early January 1856 and arrived in Victoria on the 31 May 1856, under the command of Commander W.H. Norman, Victorian Navy (VN), whom retained command until 1868.



Engraving of the Launch of HMCSS Victoria

(The London Illustrated News – 7 July 1855)

Lady Constance Talbot, the daughter of Lord Talbot, performed the christening ceremony as reported in the South Australian Register of 4 October 1855.[4]

> ***The Launch of the Australian War Steamer Victoria.*** *— ….The 30th of June will long be remembered in the annals of colonial history, as having witnessed the launch of this first steamer, of not only Australia but of any British colony……..At 2 o'clock, just before high water, the interesting ceremony of the 'christening' was performed by Lady Constance Talbot breaking a bottle of good old wine across the bows of the ship, and naming it the Victoria, ….. Mr. E. F. Young, senior partner in the firm, occupied the chair, having on his right hand Lady Constance Talbot, and on his left her father, Lord Talbot, R.N.*

Victoria's specifications include:

Length: 166 feet (between perpendiculars).

Beam: 27 feet (extreme), 26 feet 3 inches (moulded).

Depth of Hold: 16 feet.

Tonnage: 580 tonnes (burthen).

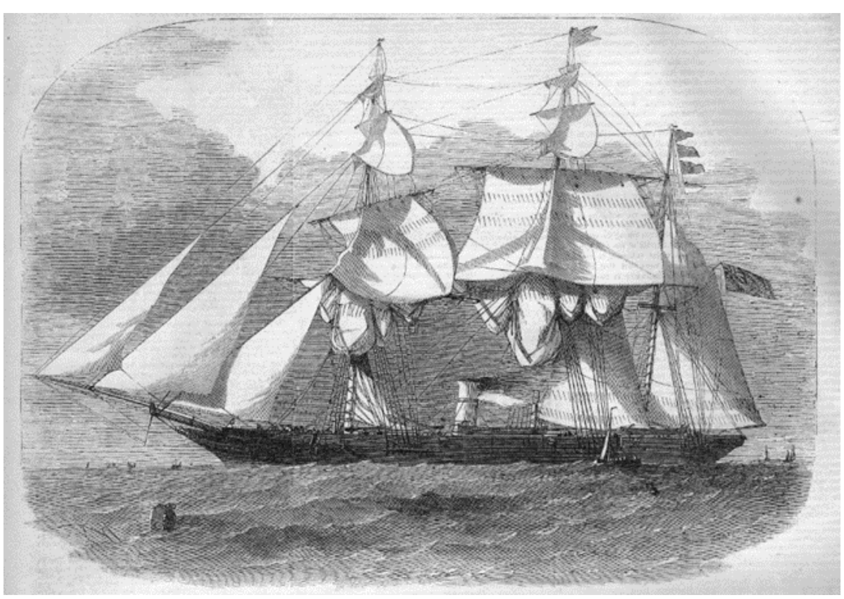
Armament: 1 x 32lb 56cwt pivot gun forward; 6 x 32lb 25cwt sled carriage guns in broadside.

Speed: 12 knots (she achieved over 13 knots during builder's trials).

HMCSS *Victoria* had classic lines and was often remarked in the Press and by other shipbuilders, captains and shipping surveyors as a beautiful ship. She was fitted out lavishly in mahogany and birds-eye maple, with fittings the equivalent of a luxury yacht suitable for dignitaries of vice-regal status.

Built in an era that saw the demise of the pre-eminence of the sailing ship navy, and the technical innovations resulting from the industrial revolution, particularly the introduction of steam power, *Victoria* was an exemplar of the best that technology could produce in a ship of her size. Not burdened with the restrictions imposed by the overarching control of the Admiralty Board, the design of *Victoria* included elements of marine technology that had not yet been introduced into, nor considered for the Royal Navy.

Some examples include the latest capstan and ground tackle equipment, a feathering screw (perhaps the first use of such a device), flushing internal water closets and extensive internal plumbing, and the provision of extensive (for the time) ventilation throughout the vessel.



Victoria on Sea Trials

(The Illustrated London News – 8 December 1855, page 684)

The hull design developed by Lang appears to have been based on a modified Gun Despatch Vessel hull form as can be seen from the following comparative compilation of half models compared against the *Victoria* sheer drawing.

Comparison of Gun Despatch Vessel Hull Forms

Half-hull Models from the NMM Collections
A – HMS *Rattler*, 1843
B – HMS *Rifleman*, 1846
C – HMS *Arrow*, 1854
C & A hull components combined
Bottom – *Victoria* Sheer Drawing

(Compilation created by, and used with the permission of
Mr. Keith Quinton, AAHU Researcher, Fort Queenscliff Museum, 2017.)

A comparison of these hull forms shows, that generally, *Victoria's* hull form is closest to that of HMS *Arrow* but with a different (Aberdeen style) bow. Lang will have drawn the plans to ensure his hull form not only ensured her capacity to meet the various roles to be performed, but also meet his ideas for seakeeping, strength and her capacity to carry the sail plan desired by Hotham.

While the vessel was largely designed along warship principles, there were many aspects of her design that more closely reflected mercantile ship building practice and fit out. Examples of this can be seen in her bow, method of hull construction, her spars, and the sail and rigging plans, which made extensive use of fittings and equipment found in the latest Aberdeen built clipper ships.

HMCSS *Victoria* had a relatively short career as an armed 'Sloop-of-War', having been paid-off on 25 June 1864 when the Victorian Treasurer declared the vessel no longer fit for 'defensive purposes'. Over the next month she was disarmed and placed out of commission with her guns being transferred to the block ship *Sir Harry Smith*. However, the Government still held considerable concern about the lack of local naval defences should war break-out in Europe.[5] Consequently, following the recommendations made in a Report on the 'Defences of Port Phillip and the Harbor of Hobson's Bay' by Commodore Wiseman, RN, published in 1865,[6] she was rearmed and recommissioned.

Due mainly to her high running costs, *Victoria's* role as a defence vessel was again curtailed and she was transferred to the 'marine survey' in the latter half of 1866. Occasionally, whenever the perceived threat to the Colony increased, such as in 1878, she was rearmed and prepared for naval service, only to revert to her lesser roles when the threat diminished. Her last voyage in the service of the Government was conducted in September 1880, but she decommissioned shortly afterward.

During her career *Victoria* was employed in several duties to the great benefit of the Colony of Victoria. Comprehensive discussions on her career milestones can be read in individual Government records and newspaper reports, and later Journal articles and books. The following provides a condensed history of the major events of her career:

- Assisting shipwrecked mariners (throughout her career);
- Police enforcement (Water Police), Customs and General Operations (1856-59);
- Repatriation of gold diggers from Port Curtis, Queensland (November 1859)
- Deployment to the first Māori (Taranaki) War (1860/61) where she served with the British 'Australia Squadron' as a 'Despatch vessel" with great distinction;
- Search and Rescue mission to the Gulf of Carpentaria to assist the search for the Burke and Wills Expedition (1861/62);
- Salmon Roe delivery to Tasmania (1864);
- Lighthouse Tender, Maritime Safety and SAR (until 1865);
- Marine Surveys (1866-1868);
- Laid up with armament removed for four years (1868-1872)
- Marine Surveys (1872-1878);
- Incorporated into the fledgling Victorian Navy (1878-1880);
- Sold to Captain Patrick and used for private charters (1882);
- Sold to Captain James Deane for £270,[7] who had her paint removed, the hull 'oiled' and a four-bladed propeller fitted. (1887);[8] and
- Sold to local shipwrights in 1894 and broken up 16 August 1895.

Further articles will follow discussing the unique, for a warship, planking technique used in building the hull, her armament and her rig.

Endnotes

1. TROVE : 'Sun (Sydney, NSW : 1910 - 1954) : 28 September 1913 : page 8 : Australia's Navy; Its Modest Beginning – The First Gunboat.
2. TROVE - Cornwall Chronicle (Launceston) : 30 April 1853 : page 2 : War
3. TROVE – Adelaide Times (SA) : 10 May 1854 : page 3 : War!
4. TROVE : 'South Australian Register' (Adelaide, SA : 1839 - 1900) : 4 October 1855 : page 2 : 'Shipping Intelligence'.
5. TROVE : 'Age' (Melbourne, Vic., 1854 – 1954) : 19 May 1865 : page 6 : Steam Sloop Victoria.
6. TROVE : 'Australian News for Home Readers (Vic. 1848 – 1867) : 19/25 April 1865 : page 3 : 'The 'Defences of the Colony'
7. TROVE : Herald (Melbourne, Vic., 1861-1954) : 18 July 1887 : page 3 : 'The Sale of an Old Identity - HMC Sloop Victoria'.
8. TROVE : 'Argus' (Melbourne, Vic. 1848 - 1957) : 29 October 1887 : page 10 : 'Shipping Intelligence'.

TROVE is the internet portal of the National Library of Australia which provides a digitised collection of the majority of Australia's Colonial newspapers and early historical photographs.

Lighting Your Model

By Arthur Wallis

There have been numerous posts in various forums on the subject of installing lighting in models. The majority of these are about simulating oil lamps on sailing ships, and the possibility of making the lights flicker.

This article is an attempt to provide a range of options, using LEDs, from the simple to the not quite so simple!

LEDs

LEDs or Light Emitting Diodes are ideal for this task as they are very efficient (they don't get hot), have very long lifetimes, are small and very cheap. A basic LED does, however, have very different characteristics to a normal filament bulb so you need to understand this before connecting them.

A normal filament bulb is basically a resistor. When you connect a supply to it, current flows through the filament which heats up. If you increase the supply voltage, more current flows and the filament gets hotter and the light gets brighter. In other words, the higher the voltage, the brighter the light.

Not so an LED. The first difference is that, as the name implies, an LED is a diode. That means that electricity only goes through it in one direction. If you connect it the wrong way round, it won' t do any damage to it, but it won't light up either!

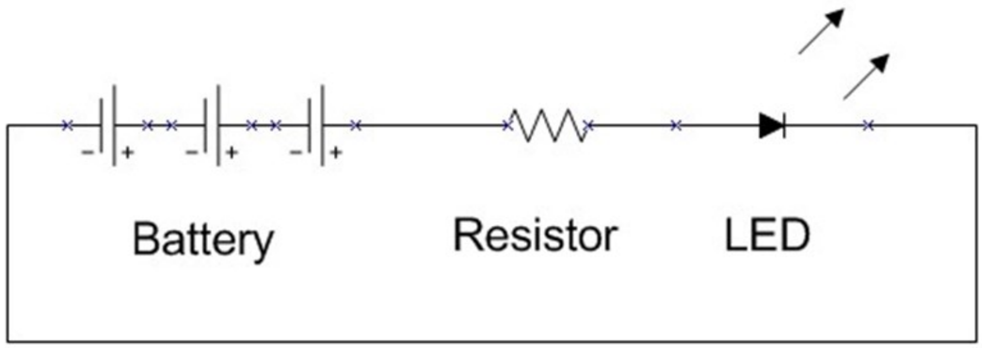
The second difference is that an LED is a constant voltage device, typically around 2 volts. If you connect a supply to and gradually increase the voltage, at less than 2 volts it will do nothing at all. However, once you get above 2volts it will pass some current – as much as your power supply can supply - for a very short time! You may see it light briefly (very briefly) but you'll need another LED! The reason for this is that the LED determines the voltage across it and power supply determines the voltage of the circuit. How much current flows depends on how much higher the supply voltage is than the LED voltage and how much resistance there is in the circuit. And that's where the problem lies, the resistance in the circuit is next to nothing, so as soon as your power supply voltage gets above the 2 volts or so that the LED requires, a large current flows through the LED.

Basic Circuit

The way to limit the current flowing through an LED is to connect a suitable value resistor in series with the LED.

You can buy LEDs with resistors or other control circuitry 'built in' but we are considering the basic LED for this application. These are available in various colours and either 3 or 5mm diameter. 3mm yellow LEDs are the ones to look for. These typically have a forward voltage of about 2.1 volts and a maximum current rating of about 20mA. (that's 0.02 Amps).

Here's how to connect an LED to a three cell battery:



Note: The two leads of an LED are different lengths. The longer lead is the positive lead (the left hand one connected to the resistor in the picture above.)

The first thing to note is that nothing here is critical. Depending on what type of cells you use in the battery, you can end up with a voltage anywhere between 3.6 volts (NiMH at 1.2 volts per cell) and 4.8 volts (alkaline battery or fully charged cells). Let's assume the nominal 1.5 volts per cell and say
4.5 volts for the battery.

Quite often, if you buy LEDs on line, you won't find the voltage specified, but they're all much the same. Let's assume 2 volts.

Now it's decision time, how much current do you want to pass through the LED? You don't want brilliant LEDs, oil lamps were a naked flame, so let's aim for 10mA current through the LED.

The calculation is simple There's 4.5 Volt coming from the battery and 2 of those volts are dropped across the LED. That means that we need to lose the remaining 2.5 volts across the resistor. To find the value of the resistor, divide the voltage across it (2.5) by the current (10mA or 0.01 Amps). That's 250 ohms.
(If you prefer, rather than working in amps and ohms, work in mA and Kilo ohms, the calculation then becomes 2.5/10 which is 0.25K ohms.)

It's just as well that the calculations aren't critical because when you come to order your resistors, you're unlikely to find the exact size you've calculated! That's because they're sold in 'preferred' sizes. (For the technical, the values go up in a geometric progression rather than an arithmetic progression). The nearest 'preferred' values are 220 ohms and 270 ohms. Either will do, but as we assumed a high battery voltage, we're already on the safe side so I'd probably pick 220 ohms.

Let's re-run the calculation assuming you're using a 5 volt DC power supply.

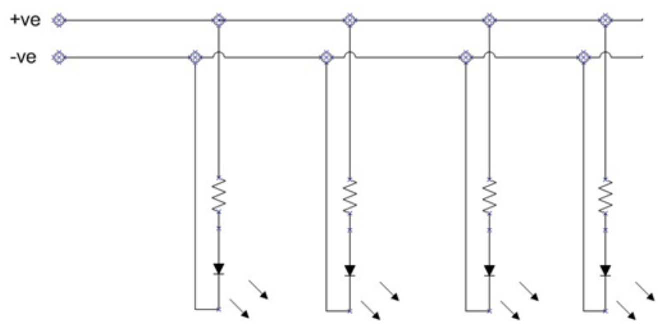
The voltage across the resistor is now (5 - 2) volts. I can manage that without a calculator (3 volts) and dividing that by 10 (milliamps) gives 0.3 K ohms or 300 ohms. Again, you won't find that value resistor, the options are 270 or 330. Either will do.

Practical Connections

You're going to need more than one LED so what's the best way of arranging this? There are two options:

1. Run a positive and negative supply along the ship and spur off to each LED
2. Run a negative lead along the ship and spur off to each LED but run a separate positive lead to each LED.

Option 1 at first looks attractive, but gives rise to a couple of problems.
The first of these is that the resistors have to be located in the positive spurs leading to the LED. This can, in some places, be a problem.

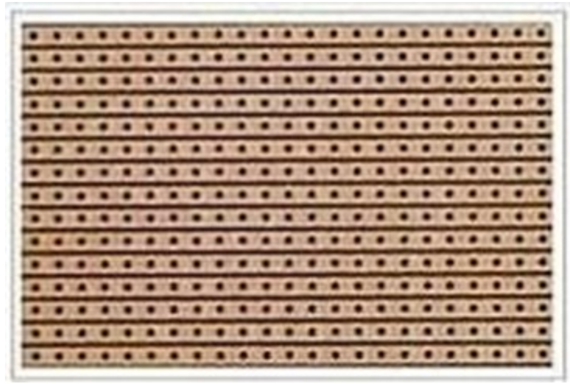


The second problem is in actually making the 'Tee' connections themselves. The negative lead can be run as a bare copper wire. This allows simple connections anywhere along its length.

It would be nice to do the same with the positive lead but, unless it's kept away from the negative lead (e.g. at the other side of the ship), keeping the connections apart becomes difficult and this will probably need to be an insulated lead. In this case, installing LEDs progressively along the length of the ship shouldn't be a problem, but going back and adding one part way along the route will be difficult.

Option 2 requires more wiring, but can actually be much easier to do. The resistors no longer have to be near the LEDs. The method suggested is to mount the resistors together on a circuit board.

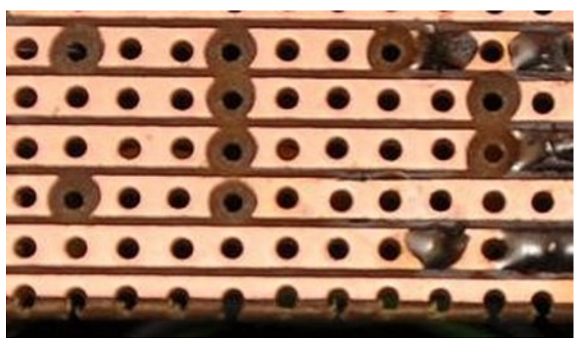
The board to use is known as 'strip board' or 'veroboard' and looks like the one in the picture below.



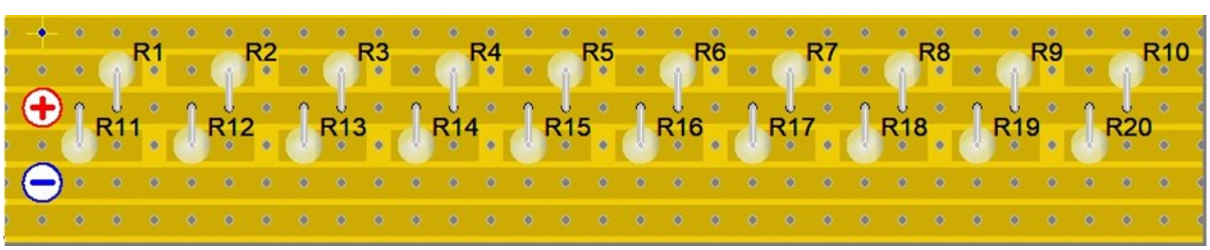
(This is view of the under-side of the board.)

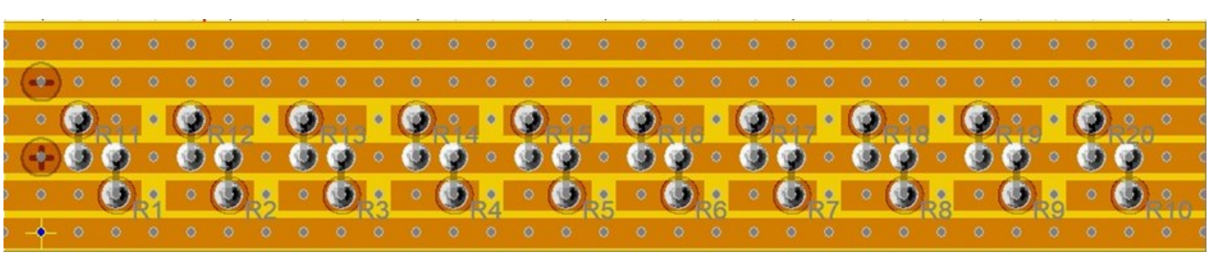
Offcuts and small sections are readily available on ebay and can easily be cut to size.
The holes are 0.1 inches apart and the copper tracks, which are laid on an insulating base, can be cut where required by using a drill bit as a countersink over any of the holes. Components and connecting leads are pushed through the holes from the top and soldered to the tracks on the under-side.

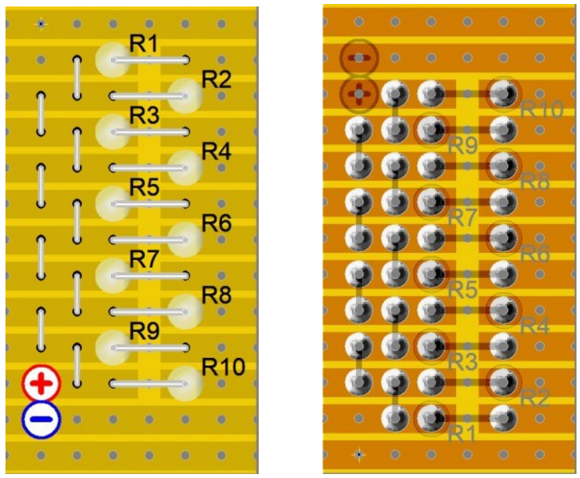
I copied the following example from a picture on the internet to show the principle but then spotted an example of what to avoid. If you look at the bottom hole in the column of four, the copper strip isn't completely cut. This can easily be rectified by a couple more turns with a drill bit or using a knife point to scrape off the copper above the hole, but is something to look out for.



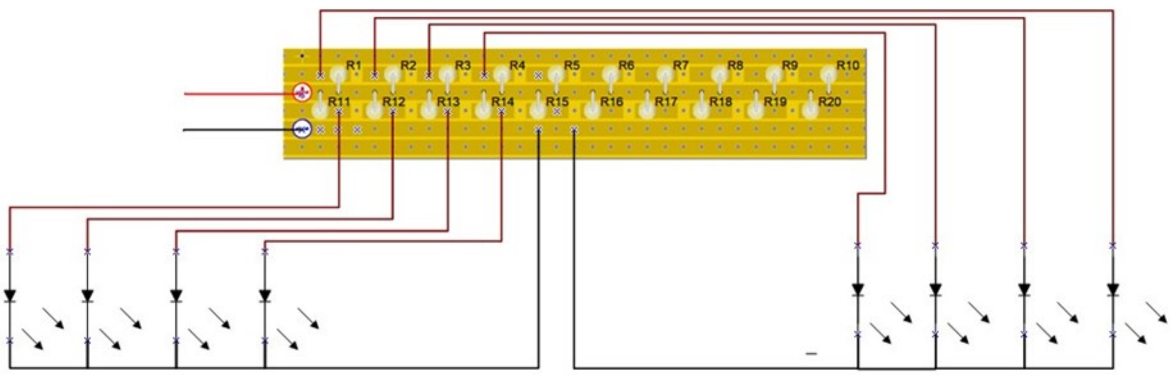
Here are front and back views of two ways of laying out and mounting the resistors on veroboard:





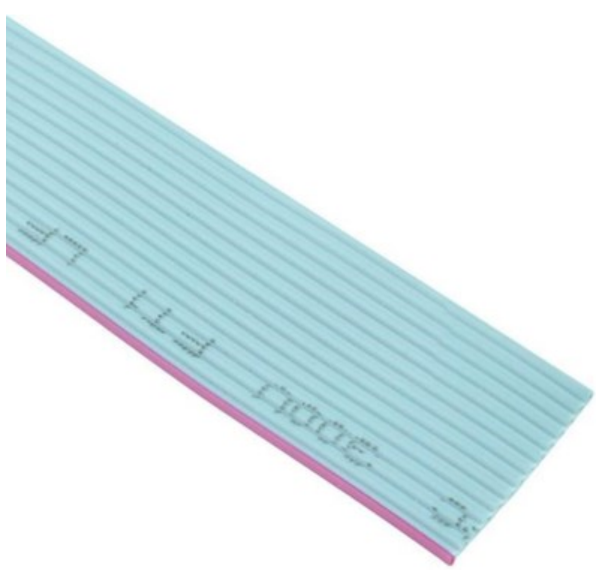


Wiring with the resistors fitted on a circuit board is much simpler:



You also have the option of making more than one board and installing one near the bow and another near the stern.

Note: You can buy sections of ribbon cable in various widths and lengths. Using this together with a bare copper wire for the negative lead is a neat way of wiring the lights. The individual conductors of the ribbon can be peeled back one by one to connect to the LEDs.



Flickering Lights

Lighting on pre 20th century sailing ships would have been provided by oil lamps. There appears to be a general assumption that this means that the lights would have flickered. In practice, an oil lamp only flickers in a draught or if it's physically disturbed. So, if you wish to make your lights flicker, most viewers will be happy with the effect and you can tell the rest that the ship's in rough water.

The hardware.

Making the LEDs flicker is relatively simple, but does require taking some people out of their comfort zone and introducing them to micro computing!
Before you decide this is a step too far, let me say that it only requires one additional item to those described above (and some pins to connect to it).

This is the item in question:

It's an Arduino Uno and the one pictured was priced at £3.14, less than $5, at the time of writing. The blue usb lead is only required for the initial setup. The board is 68mm long and 53mm wide so finding room for it should-n't be too difficult. This particular seller includes a usb lead and a strip of the connecting pins that fit the Ardu-ino's sockets.

You'll see lots of Arduinos at significantly higher prices than this, most of them looking slightly different. These have a large integrated circuit (the microprocessor) mounted in a socket on the board. The one pictured has a 'surface mount' microprocessor that can't be removed. Don't worry, it's electrically the same and all the ver-sions will do what we need to do.

The Arduino has 18 pins that can be configured as either inputs or outputs so, using them all as outputs, you can connect 18 LEDs that will flicker independently.

If you want more than 18 LEDs, as each output supplies 5 volts, it is possible to connect 2 LEDs in series to each output. Those two will, of course, flicker together so it would be best to have them physically separated - or you could simply fit another Arduino at the other end of the ship.

Programming.

Before we go any further, let's explain how to program the Arduino.

For this you need a PC (or to know a friend with a PC). It's not something you can do with a tablet or smartphone.

The first thing you need is a programme called the Arduino IDE. It can be downloaded from this page. If you have Windows 8.1 or 10, choose the 'Windows App'.

You now need a programme to install on your Arduino. You can download the programme code from here. The programme is in a zip file called flicker.zip. If you open the zip file, you will find a folder called flicker. Copy the folder to your desktop or anywhere else you prefer. We're now ready to start.

The order in which you do things now makes a difference. Plug in the Arduino. Now run the Arduino IDE programme. The programme will open with a basic 'Sketch' asking you to enter some code. Just as a check, click the 'Tools' tab and move your mouse down to the line that says 'Port'. There should be more than one option with the highest number option already selected.
If you open the programme *before* plugging in the Arduino, the correct port won't be available; you'll probably only see 'com 1'. However you can still plug in the Arduino and then select the new port that appears.
Now select the 'File' tab, click 'Open' and navigate to the 'flicker' folder. Open the folder and select and open the 'flicker.ino' file. That will open a new window with programme code in it.
Now click the 'Sketch' tab and select 'Upload'. You'll see a green progress bar whilst the programme compiles the code after which it will upload it to the board. That's it, job done!

While the Arduino is connected to your PC via the usb cable, it will be powered from the PC, you don't need a separate power supply yet

The Arduino board actually has four small LEDs on it. Two of these (usually yellow) show when data is passing between the board and the PC so they'll flash briefly when you programme the board but then go out. That leaves two which should now be lit. I've seen these in different places and different colours but the ones I have at the moment are red and green. The red one shows that the board is powered so will be lit continuously. The other is connected to output 13 for general indication. That means it's connected just the same as your lights will be, so if you look carefully, it should now be flickering! *(cont'd)*

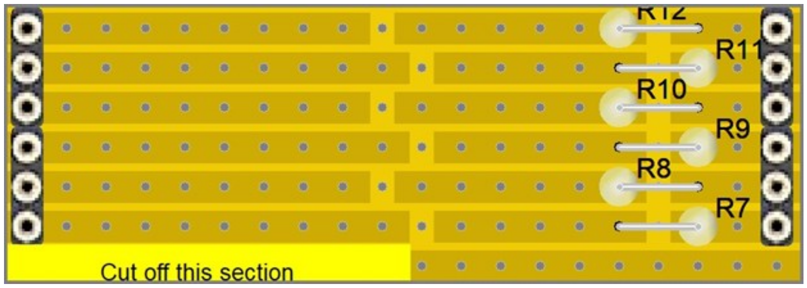
If you've got this far, from here on the connections are much the same as for non-flickering LEDs.

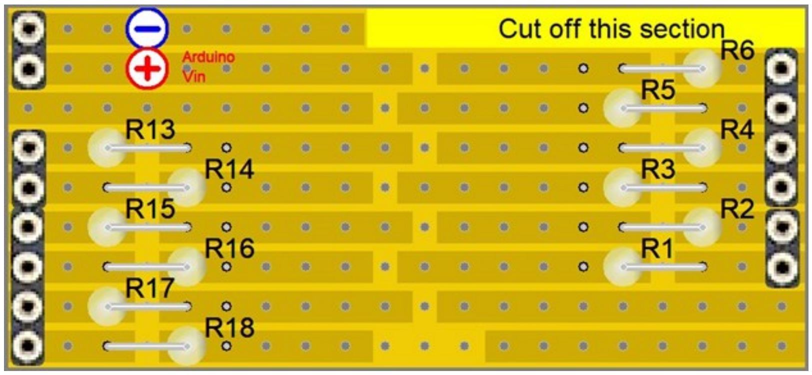
Note: If you're unsure about your ability to carry out the programming, you can experiment now, without buying any parts. You can install the Arduino software and download the code by following the links above. If you can success fully open the code with the Arduino software, you're one click away from putting the code on an Arduino.

Flickering Light Connections.

As before, it's best to mount the resistors on veroboard. There are four separate sockets on the Arduino and for some reason the spacing of these doesn't quite correspond to a regular 0.1 inch grid - so you can't fit a single piece of veroboard to the Arduino that has all the required outputs on it.

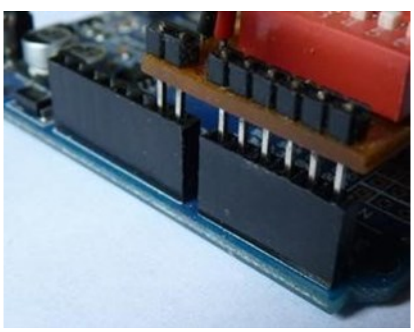
You can, however fit two separate boards.

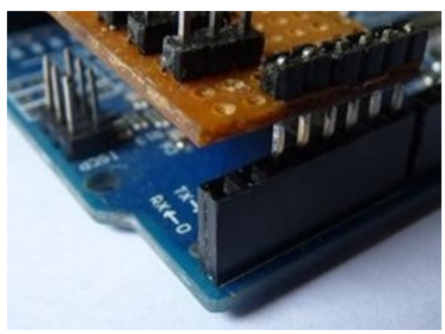




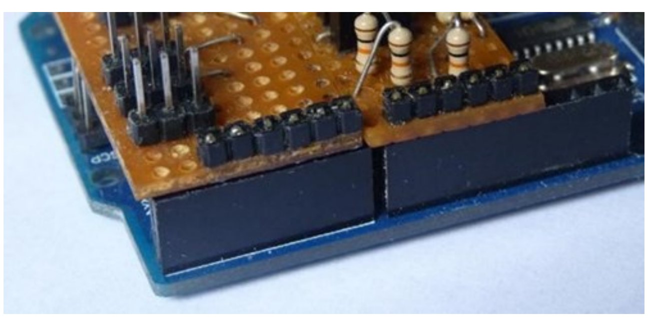
If you cut off a strip of pins and position them on the component side of the board with the longer pins through the holes you can then then turn over the board so the copper side is uppermost with the long pins sticking up through the holes. Rest the pins on a hard surface and press down on the board adjacent to the pins. The pins will move up through the black plastic until the short ends are flush with it. It's best to do this with the pins at the other end of the board as well before soldering. If you have both sets of pins in position, the pins will sit square to the board while you solder them to the tracks.
Check that the bottom board fits in the Arduino. The right hand plug fits at the top end of right hand socket. The lower two holes in that socket (numbered 0 & 1) aren't used.

This board is for a different project, but the pictures show how it fits:





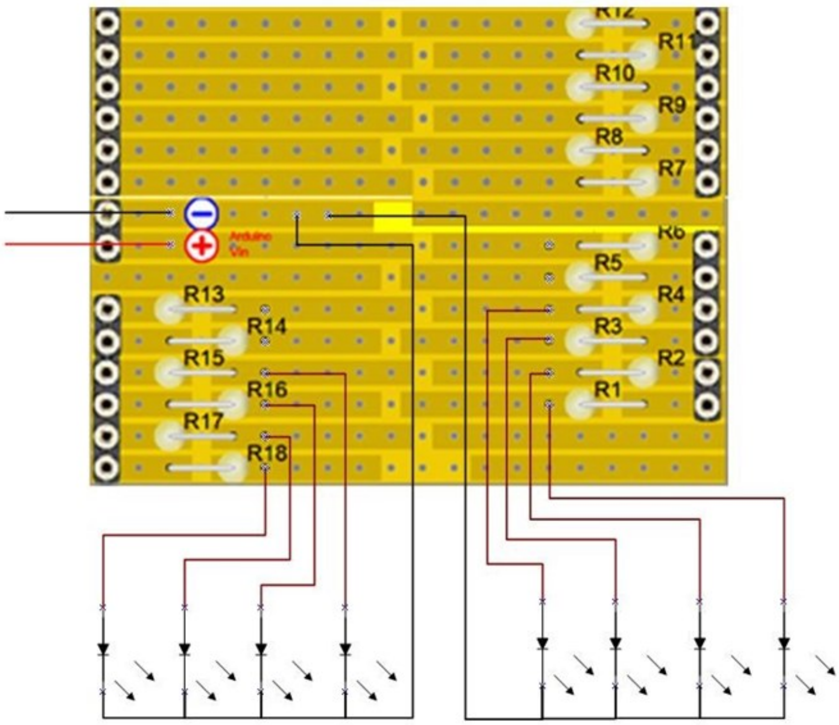
Now try the other board above it. You'll need to trim the lower edge of this board, particularly at the right hand side, to get it to fit.



Once you've done that you can cut the tracks and solder the resistors on the boards. (Note the section removed from the bottom track - that's to avoid the set of pins you can see sticking up from the Arduino at this point.) You can solder your wires to the board later as the boards can be unplugged as required.

The Arduino can be run from a regulated 5 volt supply but by far the best option is to run it from a 12 volt supply. You can connect this to the bottom board, as shown, or simply plug it into the Arduino's power socket.

And finally, the following picture shows an example of how the LEDs are connected.
(If you require more negative leads, the bottom left hand track on the top board is also a 'ground' connection.)



The lights I fitted in Vanguard were installed some time ago and use the same microprocessor as the Arduino, but not an Arduino itself so I don't have an Arduino fitted with the two circuit boards described above to demonstrate,
However I have connected the Arduino to some LEDs so you can [watch a video of the Arduino and LEDs in operation](#).

For the technical

The resistors recommended (and used in the video) are 270 ohms. These limit the current to about 10mA. The Arduino can supply more than this, the recommended maximum is 20ma but the absolute maximum is 40mA for each output.
There is, however, another restriction; the total load should not exceed 200mA. There are 18 outputs so 10mA per output is as about as high as you should go.

Although the Arduino's nominal output voltage is 5 volts, the actual voltage is slightly less than this. At 10mA load it's about 4.6 Volts. The voltage across an LED does vary slightly with current and the ones I'm using are taking about 1.9 volts on average. If you want more lights, connecting 2 LEDs in series actually has surprisingly little effect on the brightness, but you can fit lower value resistors to restore the brightness. You now only need to drop 0.8 volts, so that equates to 80 ohm resistors. The nearest ‘preferred’ value is 82 ohms.

The wattage of the resistors isn’t an issue. The amount of power they need to dissipate is the current through them times the voltage across them. That’s 0.01 x 2.7 or 0.027 watts (27 milli-watts.). The smallest ones you’re likely to find are1/8th watt, which is near enough 5 times more than you need!

The Modeler's Work Bench

Small Bar Clamps

Small bar clamps are invaluable tools to have in your modeling tool chest.

The throat depths usually vary from 1/2" on the smallest clamp to 5/8" on the largest. Bar cross sections are matched to clamp size from 4mm square for the smallest to 5mm for the largest.

These particular clamps are made from solid brass to ensure long life.

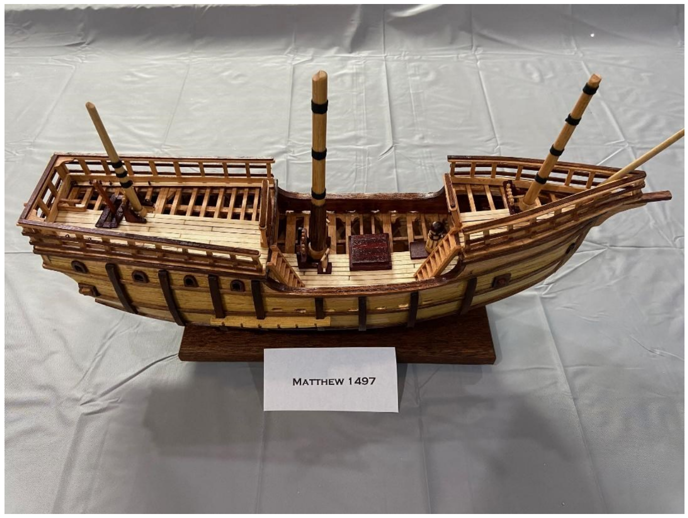
Typically available with 3 1/2", 6" or 10 1/2" jaw openings.

The clamps are available at various locations. These particular ones are from my favorite tools store Lee Valley Tools.

ModelShipBuilder

Seeking Notification of Interest

ModelShipBuilder is seeking to hear from modelers who would like to participate in an online build with a group of like minded individuals.



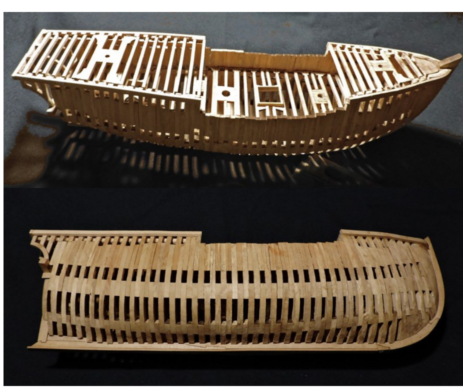
We are exploring a possible group build for John Cabot's ship the Matthew in the MSB forum area.

The model will be of the plank on frame (POF) construction.

All plans will be made available to the builder in PDF format.

For those who do not have the ability to cut their own material, a timbering set with laser cut framing will be available through: **[The Lumberyard for Model Shipwrights]**

(specific details of the timbering set and price to follow)



If you have an interest to participate in the group build

Send and email to msbj@modelshipbuilder.com

In the subject field put: The Matthew

Makerspace

By Mike Shanks

Laser technology revolutionized the model kit industry by providing a fast and efficient means to cut out wooden parts in a very precise manner. They also introduced the ability to etch text, images, and decors onto parts that previously had to either be painted or scribed. In this month's column of Makerspace we will take a look at lasers, the different types, how they work, pros/cons versus other fabrication methods and discuss the annoying slanted laser cut sometimes seen on the edges of model kit parts.

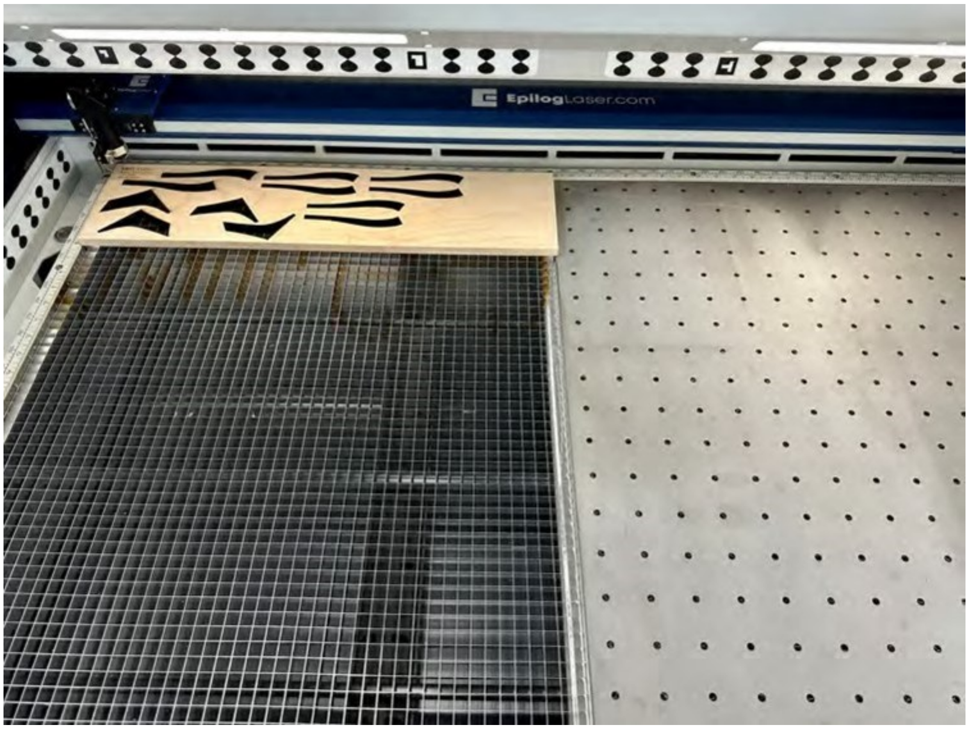
There are three primary types of laser: CO2, Fiber, and YAG/ND Crystal. Each of the three types uses a different technology to produce the laser cutting beam and is specifically designed for a targeted industry and purpose. There is no single laser that can do every laser cutting function on every kind of material. If a high powered 5KW Fiber laser is being used to cut out parts from 1/8" Baltic Birch the edge of the cut is likely to be distorted and inconsistent because this type of laser it not designed for that type of material. Fiber lasers typically range from 100watts to 10K watts and are used mostly to cut metals. YAG/ND Crystal lasers are even more powerful for cutting through extremely hard/thick materials. Fiber and YAG/ND Crystal lasers are outside the scope of our discussion and as far as I know are not used within the scale modeling industry.

CO2 lasers generally range from 10 - 100watts output. The beam is produced by passing an electrical charge through a CO2 gas filled tube. As the gas molecules are excited by the charge they produce photons (light) that is reflected through mirrors and lenses to create a very powerful invisible beam in the infrared spectrum. This beam is focused onto the surface of the material to cut a path controlled by a movable x/y gantry. CO2 lasers can cut through a variety of materials to include paper, cloth, leather, plastics, wood, and thin metals. When cutting, the gantry will move the laser head slowly and smoothly to cut through the material similar to the way a scroll saw would work We call this function ***vector cutting.*** Most lasers can also etch or burn text, graphics, and artwork onto the surface of material using a sweeping action while firing the laser hundreds of times a second similar to the way an old dot matrix printer would operate. Depending on the equipment, the etching is created in resolutions of 300, 600, or even 1200 dpi (dots per inch). This function is known as ***raster engraving***.

Follow the link to view a short You Tube demonstration of a laser focusing, raster engraving, and vector cutting: https://youtu.be/lCKnz0kOwo4

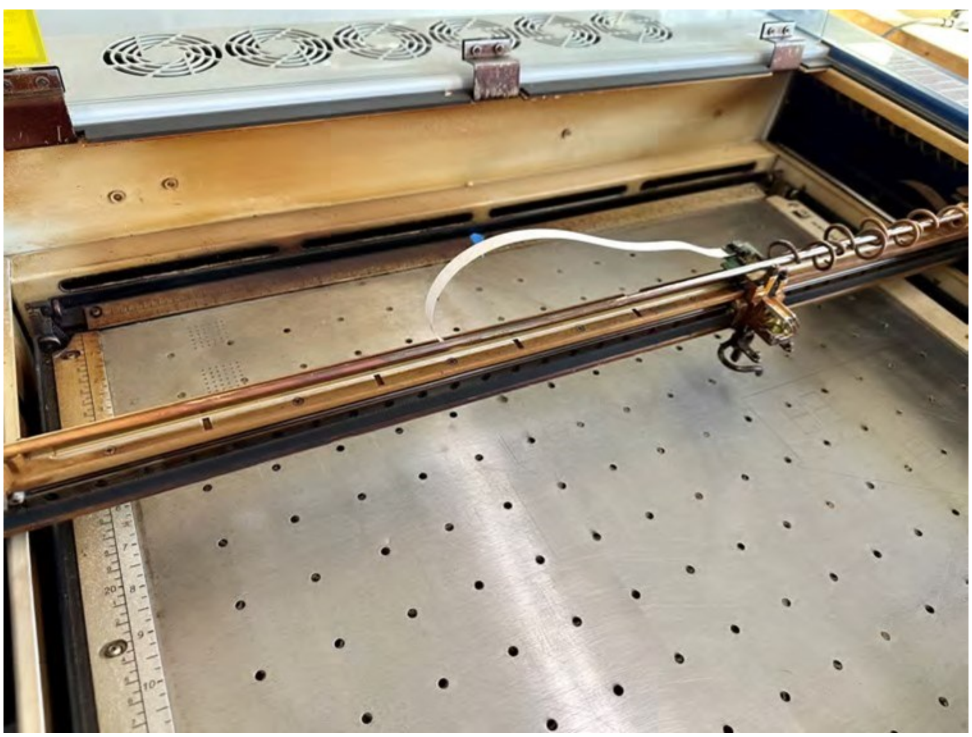
The major components of a laser would include the bed, gantry, head, compressor, and exhaust system. The ***bed*** is a flat surface the material sits on. This bed moves up and down based on the thickness of the material to allow for focusing of the laser. When cutting, we use a mesh/grid type bed allowing the laser to pass completely through the material without scorching the backside. When engraving/etching the bed is a flat surface. Most commercial lasers will feature vacuum suction through the bed to help hold down thinner materials. The nice thing about a laser is that since the only tooling actually touching the material is the laser beam (i.e. light) there really is no need for clamps or anything else to hold the material secure as you would for a CNC machine.

Follow the link to view raster engraving: https://youtube.com/shorts/11bcvl-Ww-c

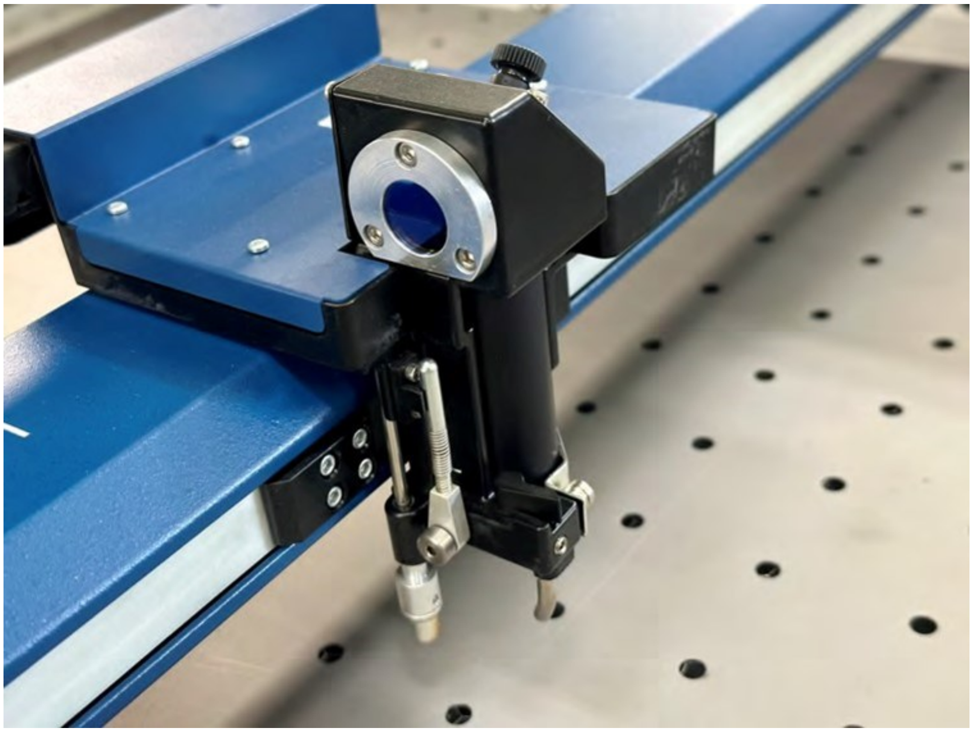


Mesh/grid bed for cutting on the left, vacuum table bed for engraving on the right

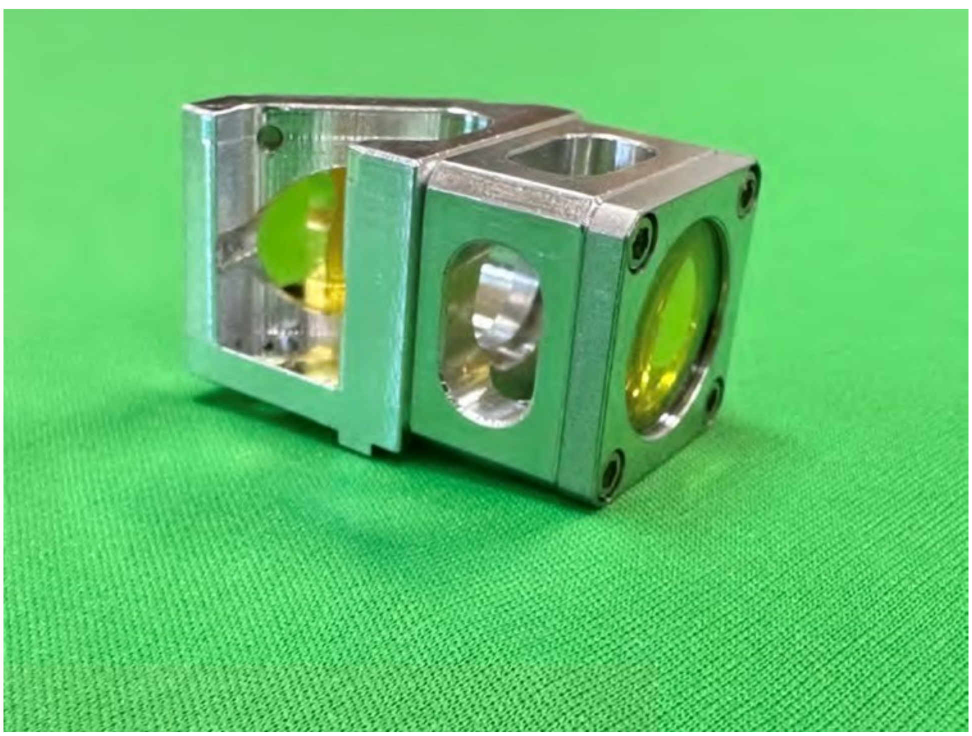
The ***gantry*** is typically driven by a Kevlar belt and moves the laser head along the x/y axis. The speed of the gantry is one of the parameters that affects how deep the laser will cut, how dark engraving will be on material, and how fast jobs can complete. If the gantry moves too fast it may not be able to cut all the way through the material. If it moves too slow it might burn the material or create excess char.



The Kevlar belt on the gantry of my Epilog Helix has hundreds of hours and is ready for replacement The laser ***head*** contains a mirror that reflects the beam 90 degrees down towards the material, a focusing lens, and an air assist tube. The focusing lens determines the kerf or thickness of the cut. Similar to a saw blade but the kerf on a laser is many times smaller. The standard kerf lens I use most often is only 0.01"/0.25mm thick. We also have a fine focus lens with a kerf of 0.005"/0.127mm. While cutting, compressed air is directed through a small metal air assist tube onto the material surface at the point of cut to cool the material preventing flame up and reducing scorching. A compressor is used to provide pressure for the air assist tube.



Laser head Epilog Fusion Pro



Fine kerf focus lens Epilog Helix

As the laser cuts and engraves wood it generates a lot of smoke which must be removed from the cabinet and shop via an ***exhaust system***. The larger the laser the more elaborate the exhaust setup must be. The system involves ducting from the cabinet through a blower and out of the building via a one-way flapper vent. The blower for this exhaust system also provides pressure for the vacuum hold down table. Our larger 48" x 36" Epilog Fusion Pro laser utilizes a 1.5hp induction blower and 4 - 6" ducting to get the job done.

Exhaust system on the Epilog Fusion Pro

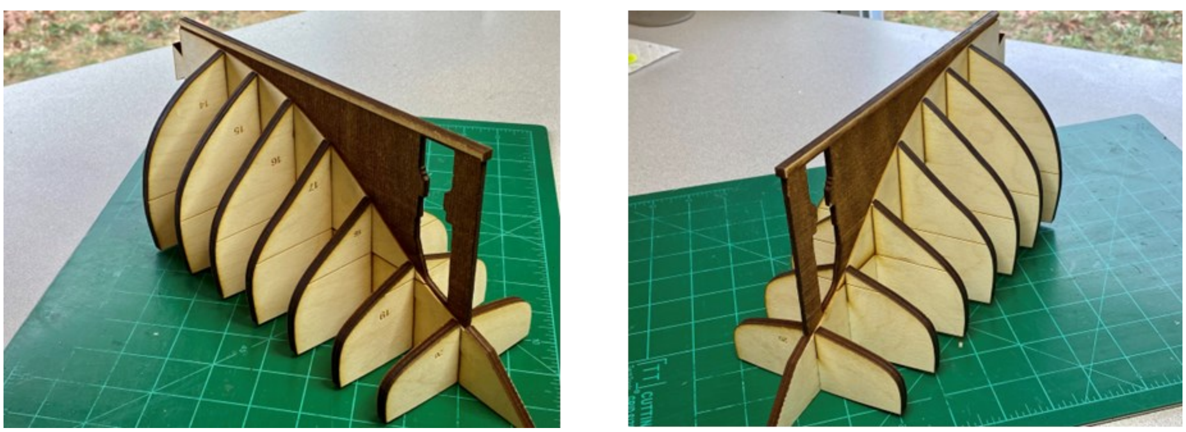
Like any tool, lasers have advantages and disadvantages when compared to other fabrication methods. Let's take a look at a few:

Advantages:

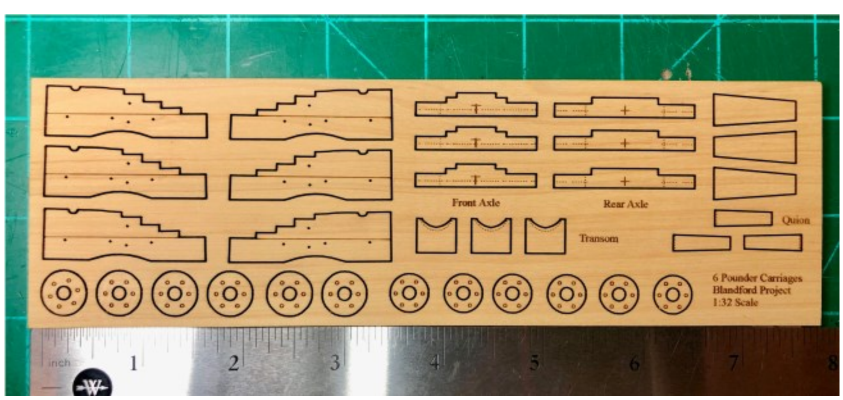
- Speed - lasers are much faster than CNC machines, don't require tool changes nor complicated toolpath programs.
- Precision - lasers are very precise and can cut sharp inside corners where a CNC machine is limited by the size of it's bit radius.
- Engraving - in addition to cutting material, lasers can etch artwork directly onto wood. This is useful for many purposes. Although considered a 2D device, commercial lasers such as the Epilog can accomplish deep etching for a 3D effect in certain use cases.
- 2-sided Engraving - since the material does not move it is easy to accomplish 2-sided engraving in full registration using a laser. The Epilog Fusion Pro includes HD cameras with auto registration capability.

- No tabs - again, since the material does not move - there is no need for tabs to hold the parts into the billet. Parts can be cleanly cut all the way around. The only reason kit companies include tabs on their laser cut parts is to prevent breakage during shipping.
- Char - laser char can actually enhance the look of some model parts such as when used to cut out planking where the char simulates caulking.

Laser cut planking with char edges to simulate caulk and engraved treenails



2-sided, fully registered, deep etched deadwood rabbet line



No tabs

Disadvantages:

- Char - laser char detracts from the look of many parts and must be removed by sanding. However, the amount of char can be minimized by a skilled laser operator.
- Safety - although lasers have system lockouts they still produce intense heat to cut materials. There is some minimal risk of flame up. Because of this laser jobs should never run unattended and proper fire suppression equipment should be installed in the shop.
- Maintenance - the cutting and engraving of wood produces smoke and soot. Woods also release various resins and saps when burned. This requires the laser cabinet, bed, lenses, positioning sensors, etc. to be cleaned on a regular basis. After hundreds of hours of use the Kevlar belts and stepper motors will also need to be replaced. The CO2 eventually depletes as well requiring the laser tube to be replaced.

•Expense - This one item puts lasers out of reach for most hobbyists. Definitely a commercial tool, lasers cost tens of thousands dollars (USD). More than CNC machines. When combined with the cost for the exhaust system, compressor, electrical requirements, and computer software you are getting into a significant investment.

Something I have often seen talked about on the forums for years is the phenomenon of lasers not cutting straight edges. The truth of the matter is not something that can be explained by a single reason. To help everyone understand, lets start by taking a look at all the different attributes in determining how a laser might cut a piece of wood in an *undesirable* fashion.

- Power Output - If the power setting of the laser is too low, the beam may not be able to penetrate all the way through the wood. If the power is too high, the edge of the wood will have excess char and reduced definition. Either end of this range will have undesirable effects. In addition, as the CO2 gradually depletes power settings must be compensated.
- Gantry Speed - This is the gantry x/y speed the laser traverses the material as it cuts. The operator must match the speed with the power output while considering material attributes to get a fine cut. If the laser moves too fast there might not be enough time for the beam to cut all the way through the material. It it moves too slowly, surface burning on the material could occur and cause the upper part of the cut to be wider than the lower part. Many retail kit companies tend to run their laser gantry speed as fast as possible to reduce job time.
- Focus - Lasers are always focused onto the surface of the material being cut. They are designed to maintain that focus through the depth of cut as specified by the manufacturer based on power setting, speed setting, and material attributes. Lasers can become slightly out of focus when the lens gets dirty. The result of this effect is the same as if the power setting were too low whereby the laser beam becomes attenuated and may not cut all the way through the material. The edge of the material will appear to be cut slanted.
- Lens - Just like cameras, lasers use a variety of different lenses depending on what they are designed to do. The lens focal length creates a kerf like a saw blade as the laser cuts. Should the laser have any issues that might cause a slanted cut, this effect would be magnified on larger kerf lenses. So, the larger the lens, the larger the angle cut effect.
- Material Attributes - The type, density, and thickness of the material being cut plays a huge factor in how the laser needs to be set up. In our case, we are typically cutting hardwoods 1/16" - 1/2" thick for most model parts. The same settings used to cut through a piece of 1/4" basswood will not work for a piece of 1/4" boxwood. If any of the settings, or combination of settings are insufficient the laser will not penetrate all the way through the wood. If the settings are too strong, the wood will get excess char, backside scorching and in extreme cases catch on fire inside the cabinet. The material must also lie completely flat against the bed. If it has any lifts or bows the laser may not cut all the way through the material.

- Maintenance - This is a biggie. Maintenance of the laser has a major impact on its overall performance and ability to consistently cut fine lines through material with engineering like precision. Most common is the smoke and wood sap getting onto the lens, mirrors, and positioning sensors. Regular cleaning is a must as is power setting compensation for the gradual depletion of CO2 over time. In addition to the belts and stepper motors mentioned earlier, the slide rail bearing surfaces must also be lubricated.

As you can see, there are a bunch of things that can cause a laser to not cut all the way through the material. Any time the material is not cut clean through you might see the affect of the cut looking angled or slanted when viewed from on edge. It is always wider at the top where the laser started and narrow at the bottom as the laser weakened. You see this in a lot of retail kits where the parts don't want to pop out of the billets very easily. Flip the billet over and you will see the laser did not cut all the way through. This was caused by any and all of the many reasons given above. Not by any single one of them.

At the end of the day, it is really up to the laser operator to ensure the quality of cut. Because scale model building is a very exact activity, it requires specific tooling. For the very same reasons modelers go for Byrnes power tools there is a very good reason Weasel Works choses lasers made specifically for scale model building. They use tight focus lenses, CO2 low wattage output, and super small kerf. The proper equipment along with a skilled operator can ensure a perfectly square cut every time.

This has been a brief look at laser technology, how they work, the good, the bad, and how the dreaded slanted cut happens. Lasers are a huge part of the wooden model ship building industry and have had a dramatic impact on the way kits are designed and fabricated. We will revisit lasers in the future with more specific topics directly model related.

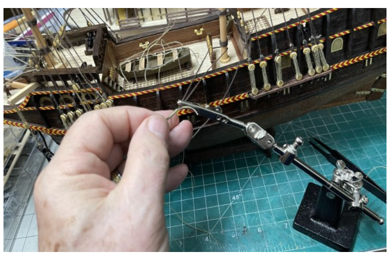
Next month we will take a look at CNC machines for model building. Until then - smooth sailing.

The College of Model Shipbuilding

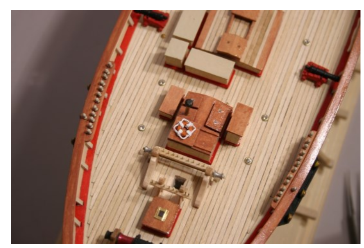
by Robert E. Hunt @ www.lauckstreetshipyard.com

Hello, my name is Bob Hunt. I own a small business called Lauck Street Shipyard. I specialize in providing very detailed instruction on how to build model ships from kits or from scratch. Other subjects are also covered in detail as well, which are all part of my College of Model Ship Building

The college of Model Shipbuilding has courses for all levels of experience. For beginners, we have Prep School Courses. These are based on kits that are easier to plank, such as Artesania Latina kit, Bluenose II.



Our Freshman Courses are also a good place to start if you are a beginner. We have a number of these courses to choose from including our most recent Golden Hind, which is based on the Ocre kit. It also has an optional masting and rigging course.



Our Sophomore Courses are designed for modelers with some experience who want to advance their skills and Techniques. One of the most popular Sophomore Courses is the Pride of Baltimore which is based on the Model Shipways kit.

Our Junior Courses are for modelers with much more experience who want to start learning kit bashing and scratch building. These courses include the Mamoli kit Rattlesnake and the Panart kit HMS Victory.

I hope you'll check out my website today to see all of the course I offer. Just go to https://www.lauckstreetshipyard.com. We also have video Practicums, and other very detailed Practicums on special subjects as learning CAD, learning different planking techniques, and how to rig a model ship. I also provide a private support forum for those who purchase one of my courses. If you have any questions please send me an email at lauckstreet@gmail.com

Lauuck Street Shipyard is a division of LSS Enterprises Inc. (A West Virginia S Corp)

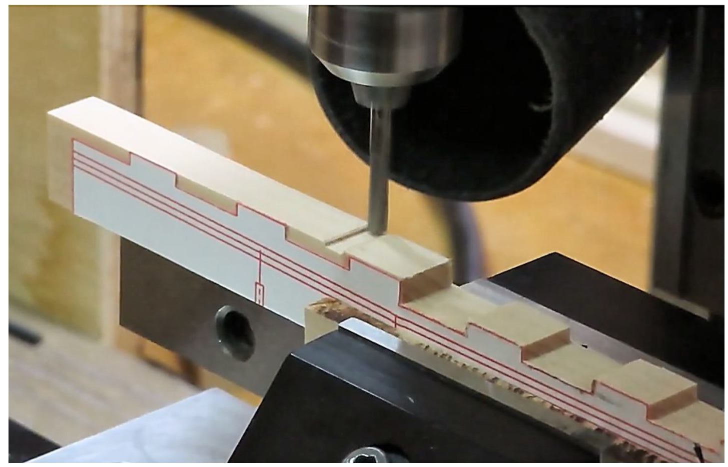
The Shipbuilders Machinies- Mills Part I

A practical Guide

By Donald B. Driskell

Welcome to this first part series on Mills. As I mentioned in the previous article about Lathes, well this article too is intended to enhance your ship building hobby. This article is not a study or a course on machining. However, I do want to convey the best I can to get you started on machining your first parts and I emphasize this machining article for hobby purposes. I really intended to write this for those just starting out.

You can use your Mill for about any hobby that requires such work, and most all shipbuilding will be made from wood and or possibly some plastic parts too. Now we can discuss the Mill for ship models only. So, lets get started !!!



Milling notches in a Keel for Cross Section

I will mention this again like I did in the previous article. Please read this first as it is vital to understand the equipment that you are working with. There are mentions of safety items that you need to be aware of. Just in case, I wish to repeat some of them here because it is very important to always be aware with little or no distractions if you can.

Please, no jewelry, long sleaves, or for the ladies, any length of hair to get caught into the rotating parts. This could prove to be very dangerous. When you are working with the Mill, I want to encourage you to keep the surrounding work area free of any clutter that something could get caught up into the working lathe. After most operations are done, please take time to removing or vacuuming the immediate cutting area of debris. It is easy for debris to get caught up into the spinning chuck and sling metal or wood shavings into your face or eyes. Please just use common sense as you only have two eyes. Being in a hurry is also a recipe for something unpleasant.

When you take a break and walk away for a while, I always make sure the headstock motor is set to off. On my Mill, the motor RPM (speed) has a knob that I can adjust the speed to "0" RPM and has a switch that turns the power off.

If you get distracted, when you step back up to your Mill, just take a few seconds to refresh what you were doing and especially if you were in the middle of making any adjustments.

So, the main difference between the Mill and a Lathe is that on a Lathe, the parts turns while the tool is stationary. A Mill on the other hand, the part stays stationary (except for x-y-z movements), and the tool is moving. I know, it is obvious, but in reality, it make a difference when you are creating a part. Do you want the part to spin in a Lathe or do you want the part to be stationary while the tool cuts. Its all in the planning and having these two machines at your side.

Before we get started, I want to say that a Mill can be a little intimidating to learn and yes, it can be a little more complicated than a Lathe, but it is more versatile.

A Mill is similar to a Drill Press, but there are major differences. For one important feature is that the headstock is usually designed to withstand ***horizontal forces*** in the x and y directions. While a Drill Press might can accomplish this task, that you might not have the precision offered by a good Mill. A Mill also allows for very precise movements in the high thousands both in the x, y and z axis. Coupling that with a Digital Readout (DRO), then you have a machine that can almost accomplish within reason what you want and that is a great asset to scratch building your own parts.

1. Some of the things that come to mind that you can do with a Mill are:
2. Steps (square ends) on a mast end.
3. Notches in a Keel and or Keelson.
4. Notches in the Floor Frames.
5. Rabbets (given if you have an Angle Plate)
6. Precise holes laid out along a strip of wood (both x and y positions).
7. Precise holes and locations for Cannon Wheel Axels.
8. Plus many other things only limited by your imagination!

A CNC (Computer Numerically Controlled) Mill will even extend into further capabilities. However, unfortunately, CNC will not be discussed here as it is a greatly involved topic that goes way beyond this article.

A Mill is often going to use what is called “End Mills”. These look like Drill Bits, but they most often have a squared off end or a flat end. Some have a slight rounded end called a Ball End Mill. In a good machinist catalog, you will see that are more End Mills each having their own purpose and function. However, for the most part, you only need a set of six (6) End Mills to get you started. Milling wood however, I suggest a different kind of bit and that is a “Downcut End Mill”. This particular bit has the flutes at the end of the bit that are slightly angled downward and the purpose is to keep the wood from splintering or fraying.

And speaking of Flutes, you have Single, Double, and Quad Flutes depending on the material that you are cutting. Then lastly, you have your basic Drill Bits. I have to stress here that if you are going to have a machine that does precision work, then you need good precision drill bits. Precision here is more of longitudinal alignment, in other words, how straight is the bit? Does it have any slight warp to it? This is not good to work with. You really need a higher quality. There are two main types of bits. Jobber Bits and Screw Machine Length HSS. Now, the Screw Machine Length HSS (and I am not sure why they call it that), but those bits are shorter than the Jobber Bits. When you buy online or any store, you are more likely to be purchasing Jobber Bits. The Screw Machine Length HSS are a specialty item. They are short and strong and make precise holes as the bit will not wander. This shortening of the bit makes it considerably stronger and less prone to breakage and shearing, making it suitable for harder drilling. However, I still use my Screw Machine bits on wood as I really like the clean hole they make.

As an interesting fact, *it is my understanding* that the tip of a bit is slightly larger in diameter than the rest of the length of bit, or you can think of it as the bit has a taper to it. The reason is for heat build up along the length of the bit. But, the taper is probably in the order of thousandths. If you know or have another interesting fact about this, you can always contact me (msbj@modelshipbuilder.com, put Milling in the Subject field).

Some things to consider when buying your Mill.

1. Does the company you are buying from have accessories for the Mill?
2. Warranty and support.
3. Is the machine proprietary design or can other accessories work with it?
4. Table top size or larger.

Personally, the reason for my brand purchase is that the company specializes in Lathes and Mills and make all their accessories—even though the machines are proprietary design, the company has a very large selection of accessories to accommodate the machine.

Below are examples of some popular Mills.

Grizzly

Harbor Freight

Klutch

Little Machine Shop

Micro Mark

Precision Matthews

Proxxon

WEN

Sherline

You can do an internet search on these machines to read more about them. I can not recommend or endorse any unit. I can only say that I personally have all Sherline Machinery.

So, now, lets turn our attention to the different components that make up a Mill. The images below in **Figure 1 and 2**, happen to be my Mill, but most all of them are going to be the same layout. The most obvious difference in some are the Z Axis handle and its location, power control, belt or maybe direct drive. Some companies offer CNC kits that attach to their Mills.

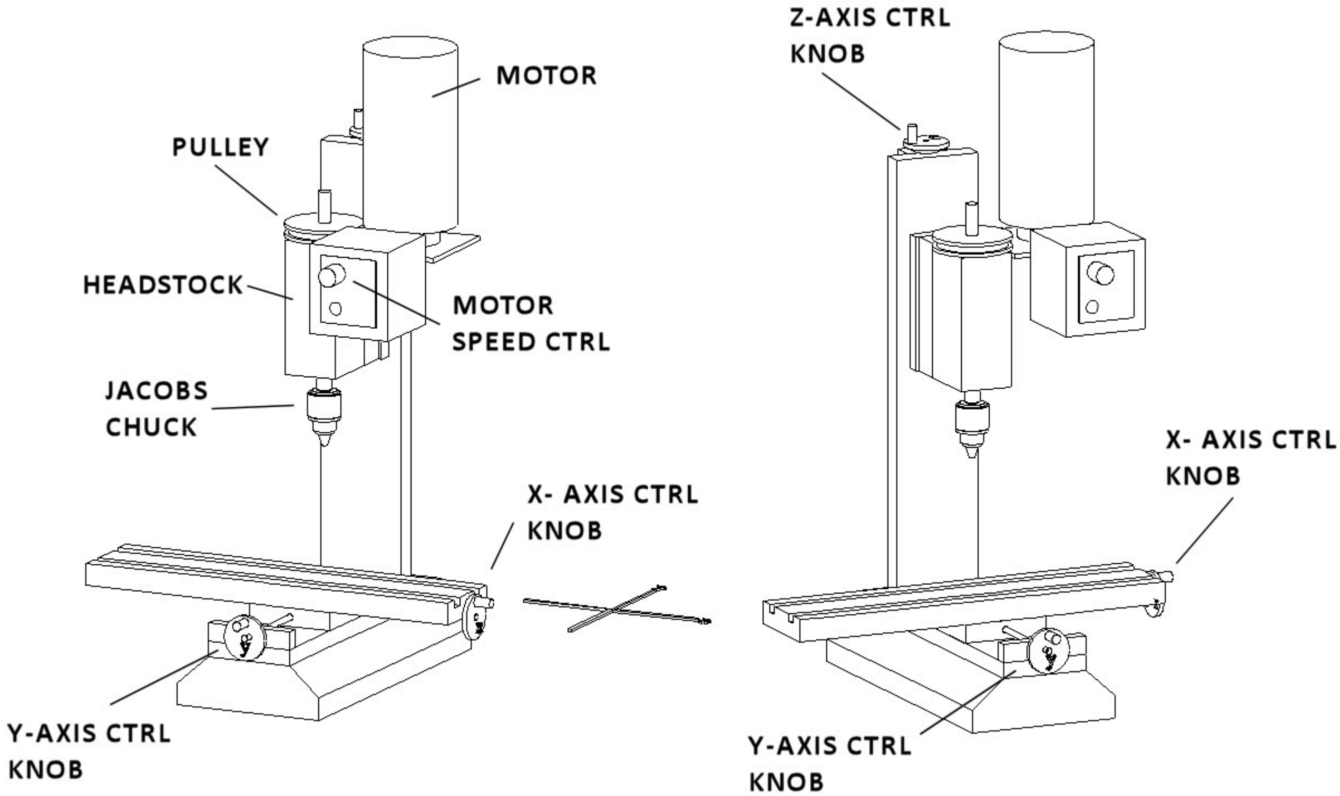
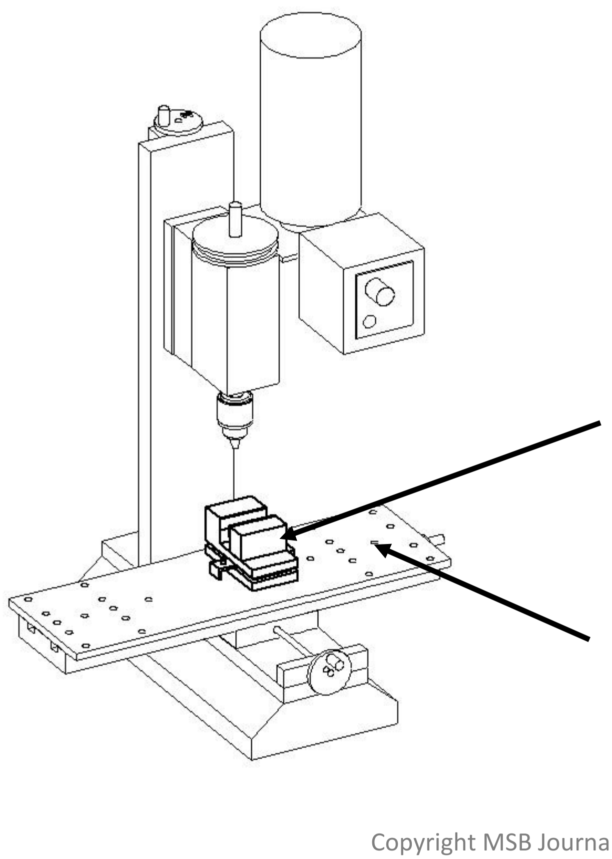


Figure 3 shows two “Screwless” Type Vises. The Allen Screw passes through vise which has a catching mechanism that tightens the vise the tighter you screw the Allen bolt.



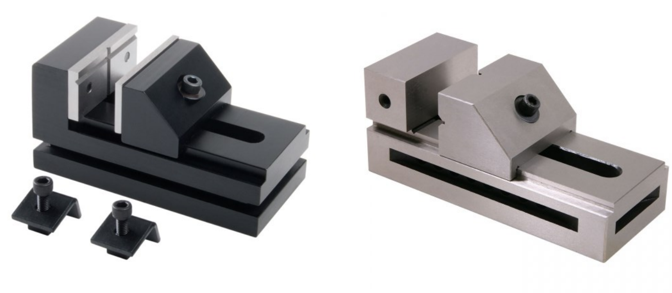


FIG. 3

Aluminum Milling Plate attaches to X Axis table

Here are examples of typical accessories that are necessary for a good start up if they can fit in your budget. Some however are actually rarely used—but depending on what kind of work you want to do.

1. Rotary Table
2. End Mills and Down-Cut End Mills for Wood.
3. Angle Plate
4. Aluminum Milling Plate
5. Screwless Vise (mentioned earlier)
6. DRO (Digital Readout for X, Y, and Z access as well as RPM)
7. Good set of machine screw bits and jobber bits.
8. Fly Cutter
9. Boring Set
10. Center Drills
11. Jacobs Chuck or R8 (tapered attachment for Chucks)
12. Clamping Kit
13. Set of mini parallels
14. Dial Calipers

Of course all of these things do not have to be purchased at one time, and actually, I do not recommend that as you really do not know what you need and how it will fit your machine for an upcoming project. Some companies offer “Start up, or Package Accessory Kits” that will get you up and running to do most basic projects. More advanced difficult projects might require more tools and fitments.

Here is something that you need to remember and put into practice. *Do not get into a hurry*. It actually takes longer to prepare the machine and clamping techniques rather than the actual machining that you are doing. Some setups (preps) take a long time to get right before you start to make that first cut. Sometimes you have to make a special holding jig to put your rough part in. So, use caution and your imagination when setting up the jig, vise, clamping techniques and machine. Practice in your mind how the cut will work first. Also, get a piece of scrap to try your part out on first.

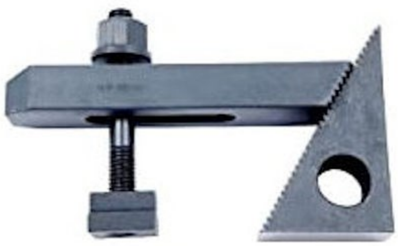
On the next page, I will show you what some of these tools look like. Being new to Mills, I had no idea what a Fly Cutter, Boring set, etc. were all about. Hobby machining does require at least a minimum set of tools to get started. The last thing you want to do is to “make shift” with something that is not made for the job.

I want to show you some tools good to have. Now, you do not need all these shown. But, I will mention a few that is a must have to work properly and safely.


Basic End Mill Set


Center Drill Set


Screwless Vise


Mill Clamping Set


Angle Plate


Mini Parallel Set


Aluminum Milling Plate


Dial Test Indicator


Rotary Table


Digital Read Out (DRO)


Boring Bar Set


Fly Cutter Set

Important and necessary

Advanced and depends on work

Good to have

Depends on your work

Now that you have seen the different types of Mills, the components that make up a Mill, and the Tools necessary or nice to have, now, it is time to move on to how to use the Mill with your Tools.

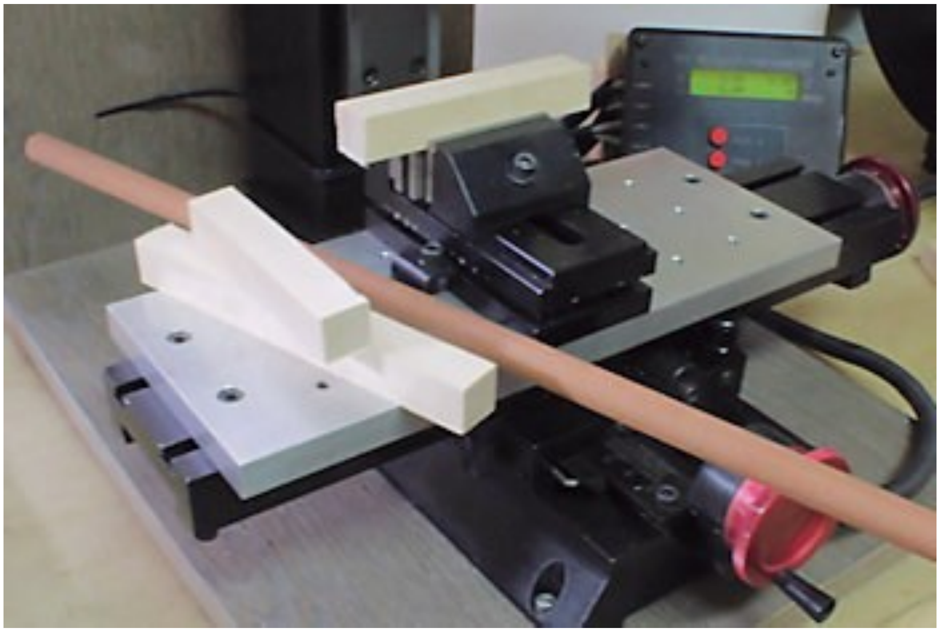


Figure 4

So, lets start out with some raw stock. The first thing we are going to do is to cut a 1mm depth into that square stock that is already mounted In the vise.

FIG. 4

Figure 5 and 6

It is very important to take note of the mini-parallels that are inserted in between the jaws of the vise. The reason they are there is so the square stock will have a firm area to rest on—even though the jaws will tighten down, this makes sure your material is square to the surface.

The image below shows the

Parallel bars supporting the stock.

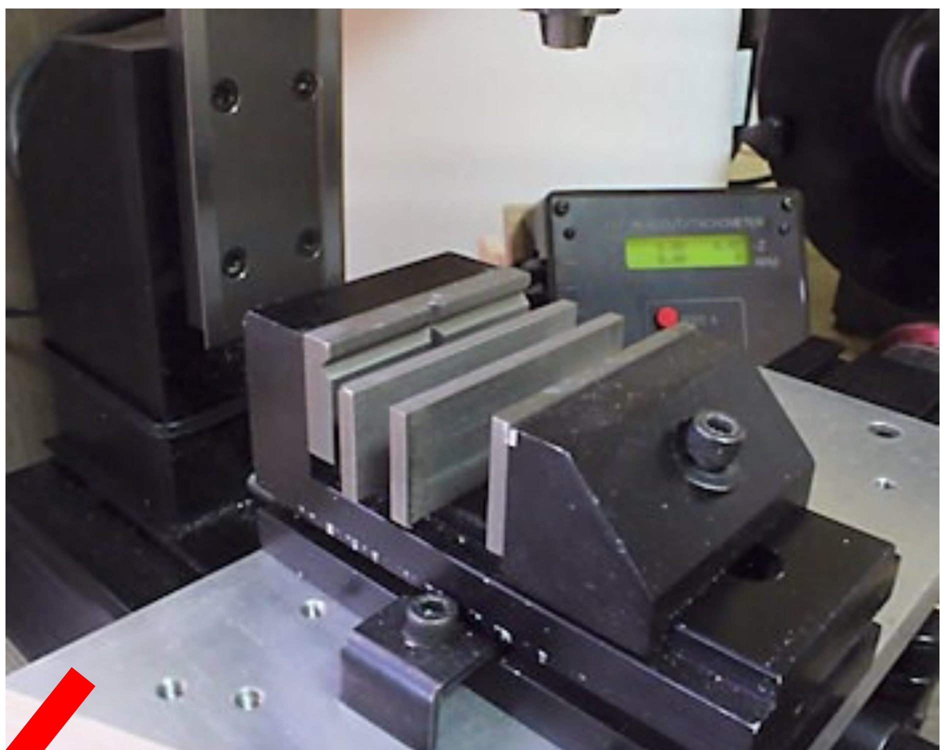


FIG. 5

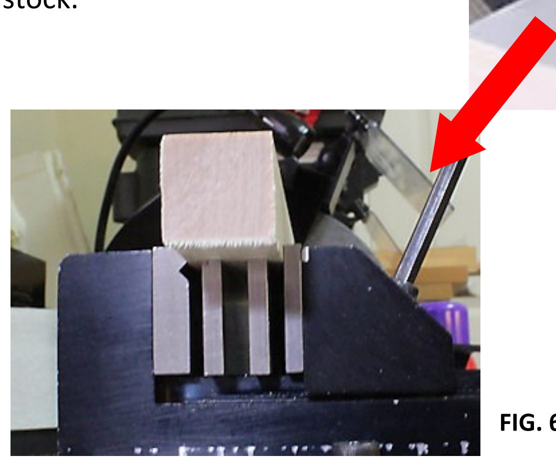


FIG. 6

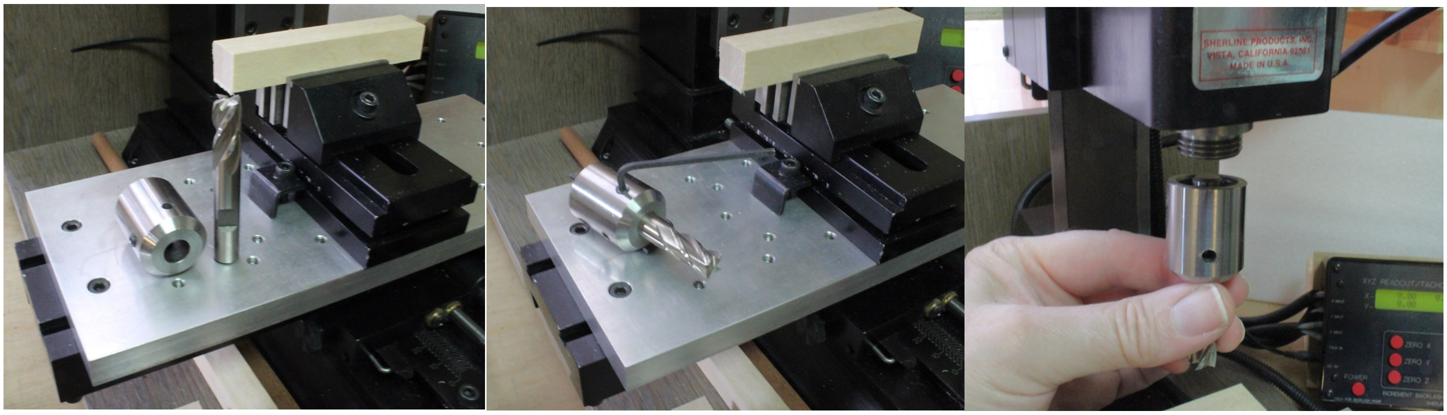


FIG. 7

Figure 7 shows how to install an End Mill ready to use (Sherline only)

Now that we have our stock squared and secure, we will install our End Mill. This End Mill is mainly used for metals, however for just a rough cut, and for larger stock it is ok. However, for precise work and clean cuts, you should buy a “Down Cut End Mill” which is discusses later. It is called a Down Cut because at the end of the cutting tool the “Flutes” have a slight downward angle and this makes for a nice clean cut into wood without “fraying” or splintering. In other words The Downcut Helix pushes burrs downward to improve top edge appearance.

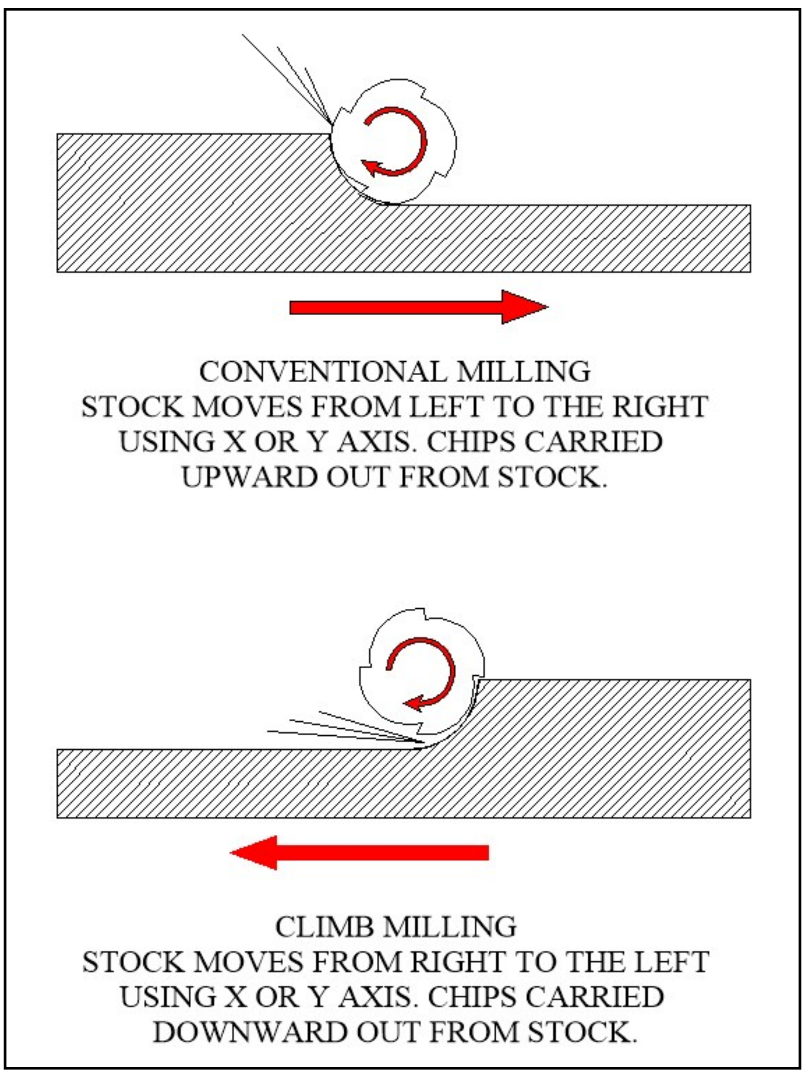


Figure 8. Before we can go any further to start making chips or cutting. There is a very important principle you should understand and that is Climb Milling vs. Conventional Milling. In Conventional Milling, the cutter rotates against the direction of the feed. During Climb Milling, the cutter rotates with the feed. When viewing your Mill from the front, the Rotating Tool always spins “clockwise”. No particular principle is the best—it depends on the situation. However, climb milling will produce a better finish.

This type of cutting is being done on the side of stock. For Milling on a top of stock then this is not something to concern with.

FIG. 8

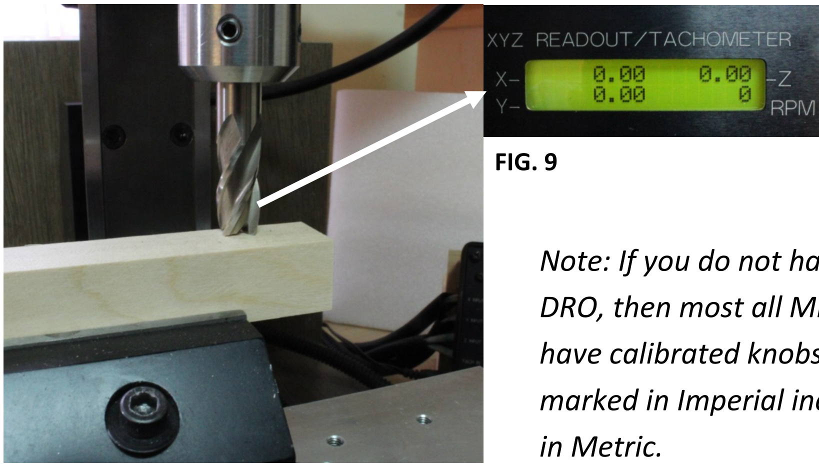


FIG. 9

Figure 9. The Digital Readout (DRO) is set to all “0” for X, Y, and Z to obtain a reference point.

Note: If you do not have a DRO, then most all Mills have calibrated knobs marked in Imperial inch or in Metric.

FIG. 10

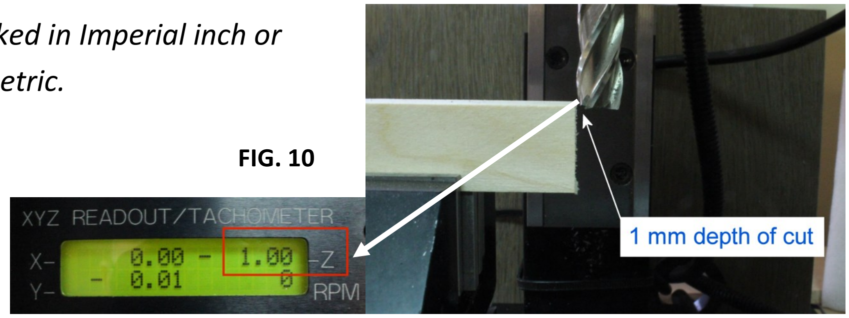
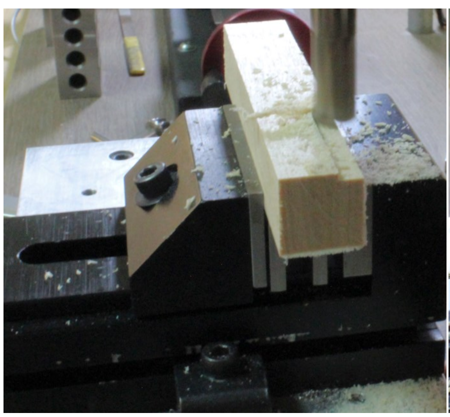
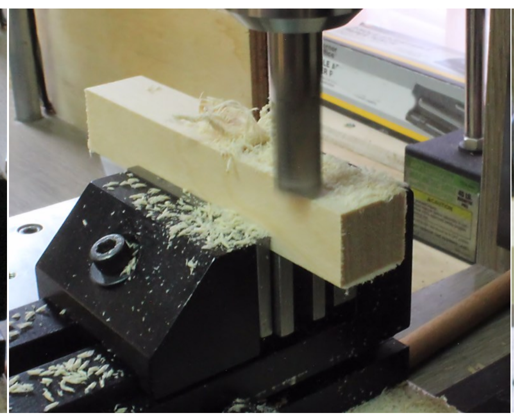
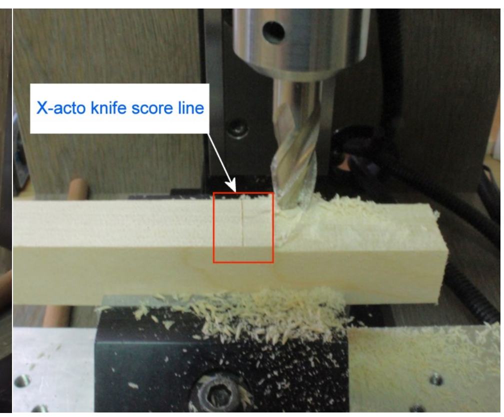


Figure 10. The Digital Readout (DRO) is set to all “0” for X, Y, and Z to obtain a reference point.







After setting up the Mill to make a 1mm depth cut, I am using climb milling technique so that End Mill will make a cleaner cut, however, the wood still has a tendency to fray. One tip I use is to “score” a line using an X-acto knife or sharp knife. When the End Mill gets to the edge of the cut line, it will make a nice clean trim. (as seen by the third image above).

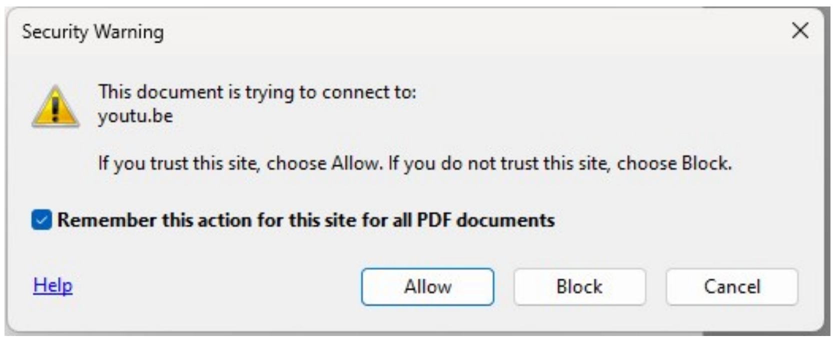
The image to the right is the final 1mm cut.

Well, this concludes Part I. Stay tuned for Part II in which I will talk and demonstrate different setups and tools. As they say, a picture is worth a thousand words, well, then a video is probably worth more. So, in this article, I am going to include two short videos that demonstrate two types of facing on a piece of wood-en stock.

The first video #1 shows a simple facing in order to clean up the end of the stock or to square up the end of some stock. The second video #2 shows a simple facing off the top of stock for squaring or Milling a grove, etc.

Instructions on how to view the videos:

Just LEFT click on the link and the Video will open in your Internet Browser such as Edge, Chrome, Firefox, or which ever browser you use for internet. Then you might have a “message box” (shown below) that opens up asking you to “allow” this link to open. So click on “Allow”.



Face or Side Milling Video #1

Top Face Milling Video #2

Note: If you do not get a message box, your computer might ask you to hold your **CTRL** key down and at the same time, **LEFT click** your mouse and the video will open for each one.

Planking the Hull of a Model Ship

Starting the First Layer of Planking

The first layer of planking on a double planked hull is by far the easier layer of planking. On a single layer planked hull, if the layer will be finished naturally rather than painted, care must be taken to ensure that each plank fits properly with no gaps between the planks. Unless you are trying to achieve a completely historically correct model ship, it is not necessary to let historical correctness drive your techniques for laying this layer of planking.

Of course, on a double layered hull, since the first layer of planking will be covered by the second, the objective should be to simply get the hull covered. A good wood filler will help achieve a smooth and true hull that is ready for planking with the second, finishing layer of strips.

The hull of a model ship is curved, and it is curved in several directions. Moving horizontally, the hull curves around to the stem and sternpost at the bow and stern, respectively. Moving vertically, the hull is curved top to bottom from the wales to the keel. I'll talk more about the wales in the section that covers the second layer of planking.

These curves create a unique situation. Since the objective in planking the hull is to use a variable number of planks to cover it entirely from bow to stern, you will find that you can't simply lay strip after strip without adjusting the width of the planks at some point on the hull. This is because the hull is wider in the center and stern than it is at the bow.

There are special situations where the shape of the hull will allow for simple, straight shaped planks to be laid end to end with no need for the tapering of any of those planks. The *Bluenose* and *Bluenose II* kits fall in this category because the shape of the hull is very streamlined from bow to stern. However, such hulls are not found in warships which require a wider hull often with a blunt shaped bow for stability due to the weight of the guns across one or more gun decks.

Over the years, many modelers have contacted me for recommendations on purchasing a plank bender simply because they are available in stores and online hobby shops. My answer has always been: save your money, and don't buy a plank bender.

When a hull is properly planked, the strips will bend naturally along the curves I've just mentioned. All too often modelers try to bend the planks in an unnatural manner which usually results in the plank breaking unless it has been soaked in water and heated with these expensive plank benders. Using such tools puts undue stresses on the wood which may result in popped planks as the wood ages.

I do recommend that you **always** soak your planking strips in water for both layers of planking. The first layer of planking is always a thicker wood, so it does not bend easily around the curves of the hull without some softening. Soaking the planks in plain water helps to soften the wood.

The second reason you want to soak your planking is because the glue I have always recommended for planking the hull is Zap-A-Gap, a cyanoacrylate glue or super glue. This type of glue relies on moisture to activate it. Dry wood can be difficult to glue using this type of glue; however, a moist plank will stick almost instantly when using Zap-A-Gap. There are alternative cyanoacrylate glues that I have tested that work just as well. These would include Gorilla Super Glue, and Elmer's Stick Fast Instant CA. You can find these online at Amazon.com.

I would not recommend using a white woodworkers glue such as Weldbond or Titebond to attach planks to the hull of a model ship. Using these types of glues requires using clamps made specifically for attaching planks to the hull. It has been my experience that these clamps, which require that you screw them into the bulkheads, can split the bulkhead regardless of what it's made of. Also, such clamps can be very difficult to screw into the bulkheads when a hard wood or particle board is used. They require pre-drilling which takes additional time.

Wood glues such as Weldbond work best when there is a large surface area between the two pieces of wood. Bulkheads are thin and do not provide sufficient surface area for a strong bond. I have tried using such wood glues and have had other difficulties with them as well.

Inevitably, glue will ooze out between the planking. In addition, wood glues such as Weldbond, do not sand easily. Although super glue does seep out between the planks, it can be sanded away more easily and disappears when a finish is applied to the wood. Because super glue will bond almost instantly if the plank is moist, there is no need for clamping. This is the primary reason why I prefer to use super glue when planking the hull of a model ship. I've used super glue on plywood, particle board, and solid wood such as basswood without any real difficulties.

There is one drawback to using super glue - the glue can cause one’s fingers to stick to the planking strips! Practice makes perfect. You will learn how to avoid this side effect as you gain more experience in planking the hulls of your models.

So, let’s dig in and start laying the planks to that first layer. Your kit plans will always tell you where to apply the very first plank on the hull because this very first plank is a reference point for all of the other planks.

Generally, this first plank lies at the location on the hull where the wales are. The wales on a ship were thicker planks that acted as a belt. A ship’s weight is not distributed uniformly. The bow and stern of a ship are heavier than the waist area. As a result, this causes the bow and stern to sag downward which in turn causes a phenomenon known as hogging.

To counter this sagging, the thicker wale planks serve the same purpose as a belt in trousers. The wales help to provide added support at the bow and stern to reduce the sagging and alleviate the hogging effect. The wales are always the central most reference point in the ships planking.

Larger warships will have multiple rows of planking for the wales. The number of planks is not important. What is important is exactly where on the hull the wales lie, and your kit plans will show this location.

The location of the wales is usually measured from the topmost edge of the hull planking. On most kits I’ve built, measurements are given in the kit instructions from the top of the bulkheads or, when a plywood upper hull part is used, from the top of that plywood part.

First, follow your kit’s instructions to mark across the bulkheads where the first plank will be laid. Normally I will start gluing the plank by inserting one end into the rabbet joint at the stem. Now you know why the rabbet joint is so important.

Photo 1

Photo 1 shows the first two planks of the first layer of planking on the Artesania Latina kit, *HMS Surprise*.

The first thing you should notice from this photo is that there is no stem or keel attached. That is because the design of this kit forms the rabbet joint by allowing the planks to extend across the center keel on both sides. After all of the planking has been installed and sanded, the stem, keel and sternpost are added on top of the planking where it crosses the center keel. Such a design is uncommon, but it does make it easier to create the rabbet joint.

Photo 2 shows a more typical situation where the rabbet joint was created when the stem, keel and sternpost were added to the outer edges of the center keel. This shows the first plank being laid on the Model Shipways kit, *Armed Virginia Sloop*.

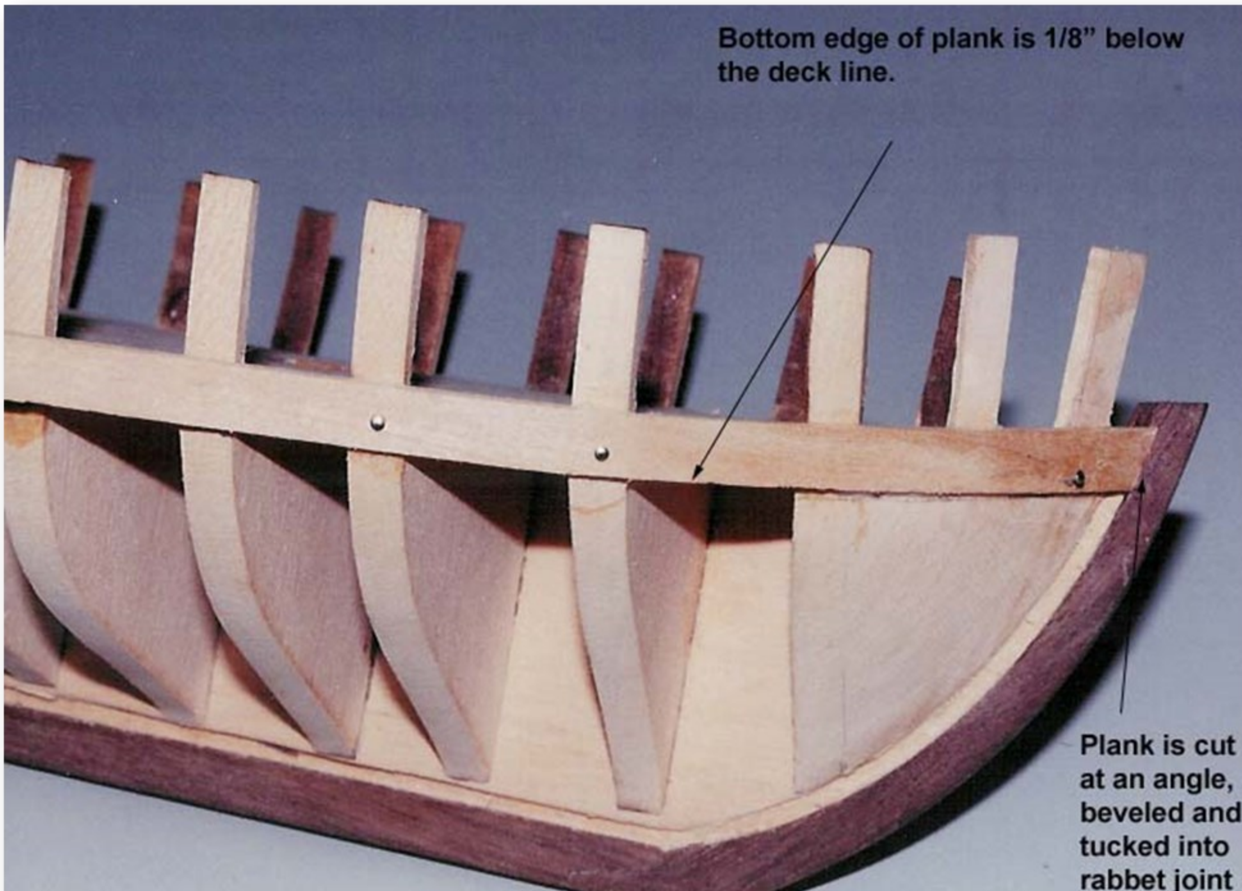


Photo 2

Notice that the tip of the plank at the bow end had to be cut at an angle to match the angle where it meets the stem. The plank is also beveled on the inside edge of this tip so that it fits the rabbet joint perfectly. The rabbet joint is a special joint used on all wooden ships that forms a seal so that water can't leek into the hull. There are two edges to the rabbet joint. The upper edge runs along the bottom of the bulkheads. This line is called the **Bearding Line**. The lower edge is wide enough for both layers of planking to fit into it and is parallel to the upper line except at the stern. This line is called the **Rabbet Line.** The rabbet joint is cut between these two lines.

In Photo 2 you can also still see some moisture in the plank at the bow where the plank is a darker color. As you can see, the bend around the bow filler block is very natural. Small brass nails were used to secure the plank to the bulkheads.

When applying these nails, I use tweezer nose pliers. By gripping the nail near the pointed end with the pliers, you can first push it into the plank and bulkhead just using force. Once the nail is started, if your bulkheads are soft basswood or soft plywood, you can push the nail in completely by pressing on the head of the nail with the flat side of the pliers. Harder wood bulkheads will require the use of a small hammer.

You can also clearly see the rabbet joint in this photo extending down the stem and across the keel. Notice that the bearding line of the rabbet joint meets the bottom of the bulkheads and the rabbet line meets the edge of the stem and keel.

On the next page, Photo 3 shows the wale being applied at the same point as the first plank laid in the first layer of planking. I have darkened the rabbet line around the wale to emphasize this area at the stem. In double planked hulls, because the wales are thicker than the other planks, the rabbet joint must be widened at the bow for the wale plank to fit into it. A #11 X-acto blade works well to create the widening of the rabbet joint, since it has a sharp tip that cuts the cross grain of the stem more easily.

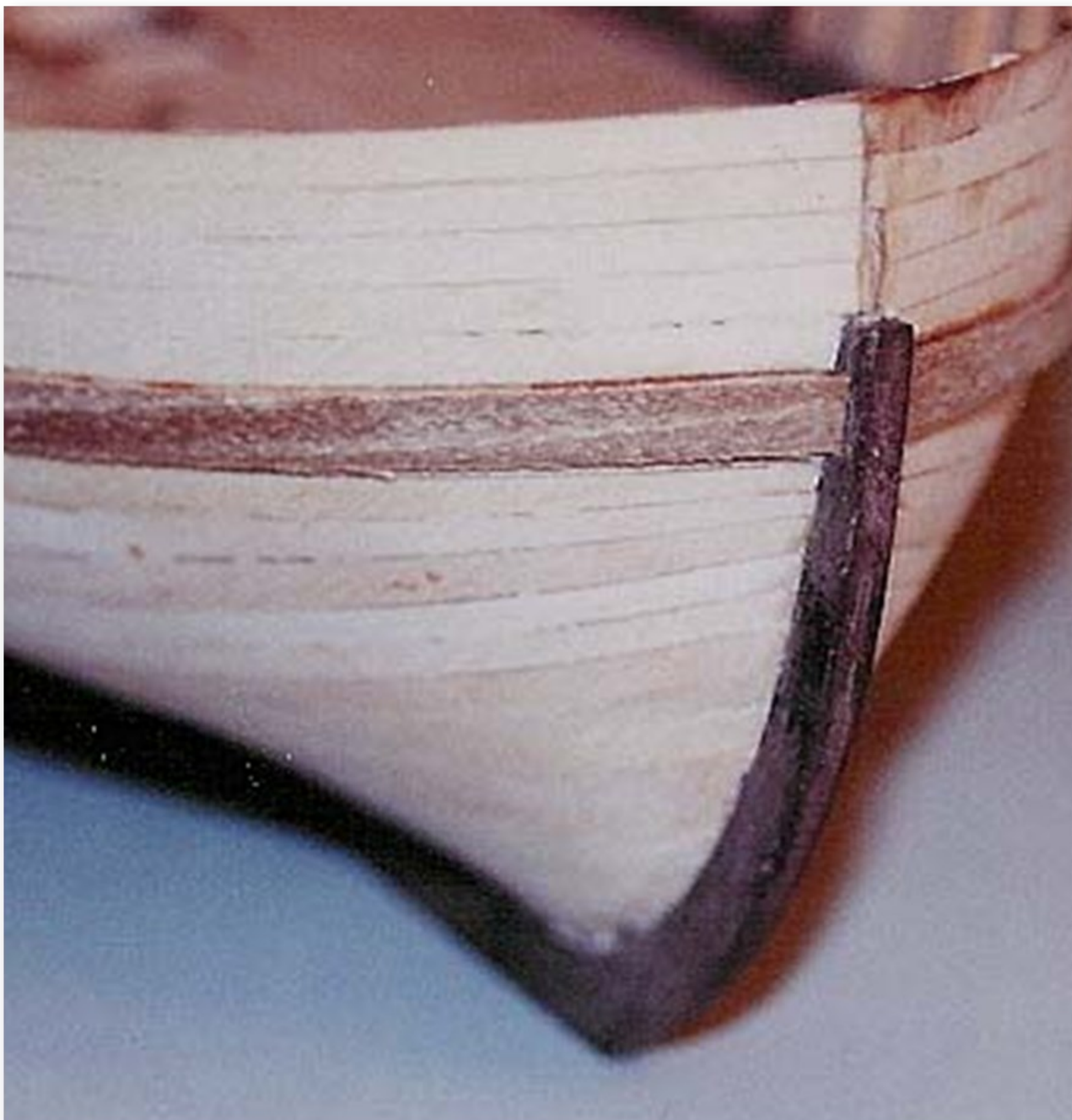


Photo 3

On the next page Photo 4 shows the first plank on the Model Shipways kit, *Bluenose*

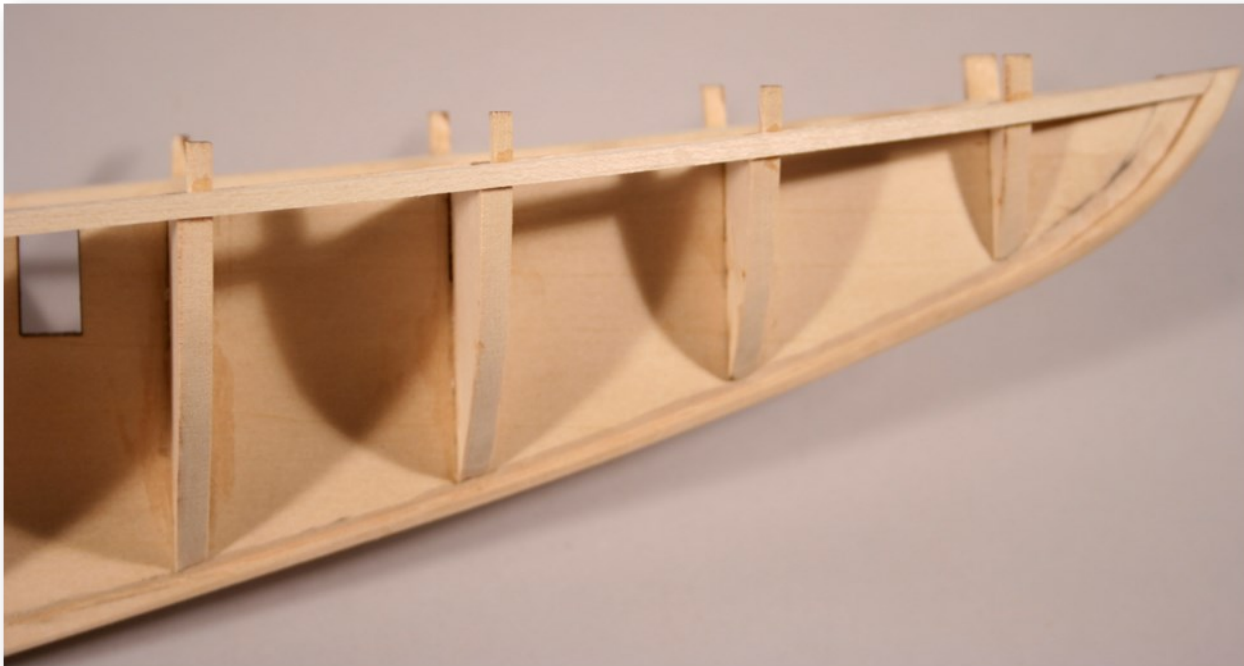


Photo 4

In Photo 5 below, you can see a hull that creates the rabbet joint in a slightly different manner. The first plank is at the deck level, and it tucks into the rabbet joint at the bow. This photo shows the Caldercraft kit, *HMAV Bounty*. In this kit, the center keel is beveled at the bow leaving a central area that is not beveled. After both layers of planking are installed, the stem, keel and sternpost are glued to the central area of the center keel, locking the planking in place. Many kit instructions show this method, which is actually identical to the one shown in Photo 3; but the stem, keel and sternpost are added ***after*** the planking has been installed.

Photo 5

This *HMAV Bounty* kit started the first layer of planking at the top of the bulkheads. As you can see in this photo, the filler blocks at the bow give the planks a surface to attach to as they wrap around the first bulkhead and meet the keel. This not only ensures that the shape of the hull at the bow is correct but also adds strength to the planking at the bow.

Once the first plank has been installed, the task of cover the hull with the first layer of planking becomes a matter of analysis. Cutting and trimming the planks based on that analysis should result in a completely planked hull, without any undue stresses on the individual planking strips.

Hull Analysis

Over the years I have developed a procedure I call ***hull analysis*** which makes the planking of the hull less intimidating. This procedure involves breaking the hull down into smaller areas. After completing this procedure, you can visually see how each smaller area is shaped at the bow and stern. Knowing the shape of a smaller area of the hull will enable you to determine when to use one of two very special planks: the ***stealer*** at the stern and the ***joggle plank*** at the bow. Seldom will you need to use both of these special planks on the same row of planking.

The hull of a model ship is covered with rows of stripwood. There are a certain number of strips that extend across the entire hull from stem to sternpost. The center area of the model is the starting point for determining the shape of each row of planking.

The bow area is typically less narrow than the center area; however, the center area is not the widest area of the hull. The widest area is actually the stern. So if the hull is widest at the stern and gets narrower moving towards the bow, how do you fit the same number of planks on the hull from stem to stern? Logic would tell you that you start tapering the planks at some point where the hull begins to narrow, but that logic is incorrect. The widest area at the stern is left with gaps between the planks. These gaps are filled in with ***stealer planks***.

At the bow, the opposite effect takes place. The planks get narrower and narrower, and on some hulls, the tip of some planks may come to a sharp point. Just as the decks did not have planks with a sharp point installed, neither does the outer hull. The remedy to this problem is to use the ***joggle plank****.* After I show you how to break your hull down into smaller areas, you will be able to see where these two special situations may arise. I will then show you how to handle these special situations.

I ***always*** plank a single side of my hull at a time. In the 30 years that I have been building model ships, I have never ended up with a warped hull by following this method. There is a myth floating around that you must match one side of your planking with the other side, otherwise your hull will warp. This simply is not true. Real ships were not planked in that fashion.

There are many variables that define the shape of the hull on your model. Those variables are defined by the amount of sanding that you do when you fair out your hull after gluing the bulkheads in place. Inevitably, you will have areas on one side of the ship where you sanded more aggressively than you did in the same area on the other side. Even though you won't be able to detect this slight difference visually, it will affect the lay of the planking. It is these sanding variations that make each side of the ship unique, not technically symmetrical, and if the two sides are not exactly identical, you cannot match the planking on one side to the other side, plank by plank and shape by shape. Keep that in mind as you plank one side completely and then the other.

First, take out five or six strips of planking that your kit uses for the first layer. Even if your kit only includes a single layer of planking, you will still perform this procedure. You will use these strips to break down the hull of your model into smaller areas.

In Photo 6, I have installed 5 planks across the upper most area of the hull of the Model Shipways kit, *Pride of Baltimore*. These strips were not cut or shaped in any manner. The strips simply ran from bow to stern in one long, continuous line.

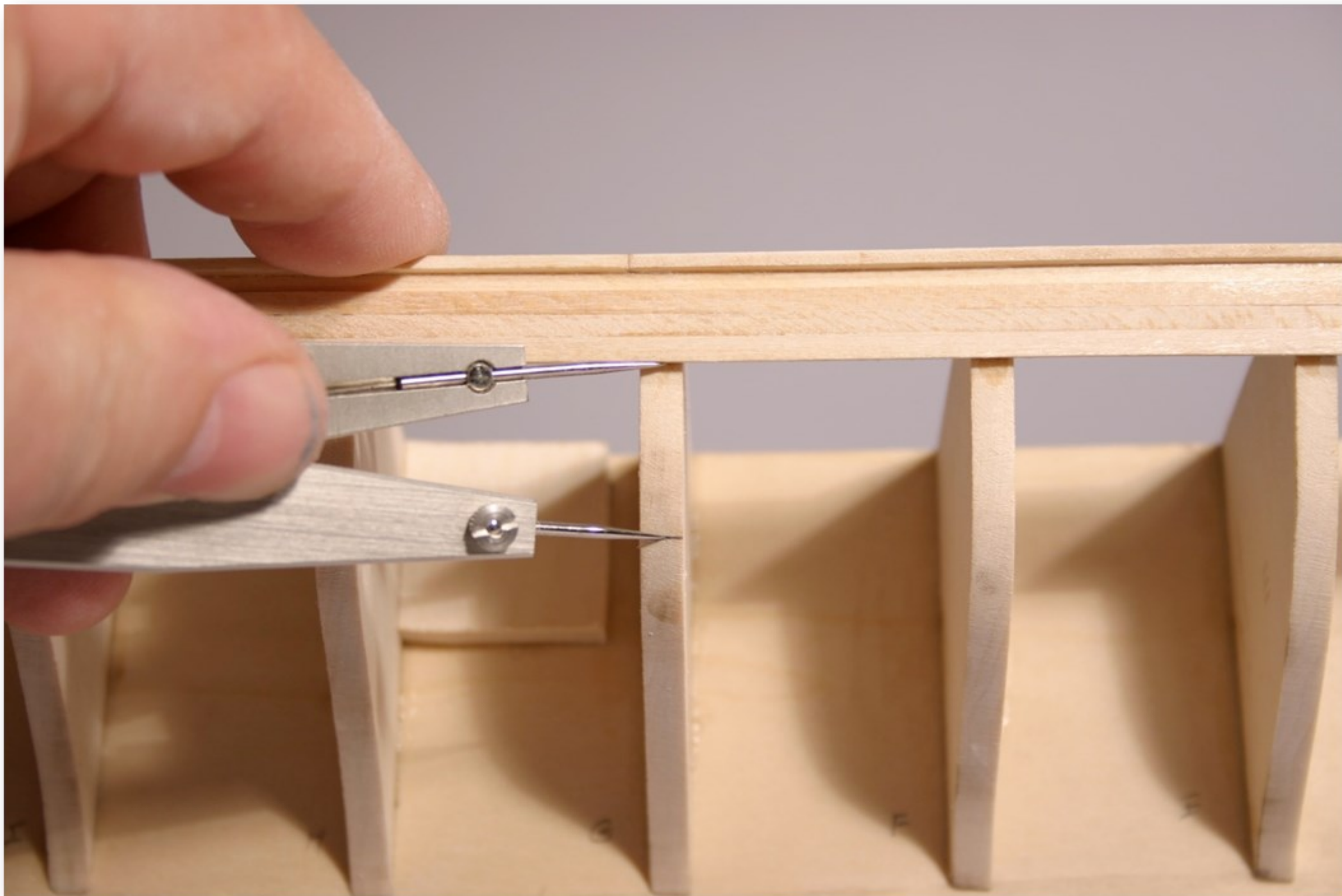


Photo 6

As you can see in this photo, I am using proportional dividers to mark the location of a plank that is six rows down from the last full plank I had laid. You can purchase proportional dividers on Amazon, but be sure to get the ones with a scale on them. If you have a pair of proportional dividers, you must first set them up to take these measurements.

Photo 7 shows the pointed end of the dividers.

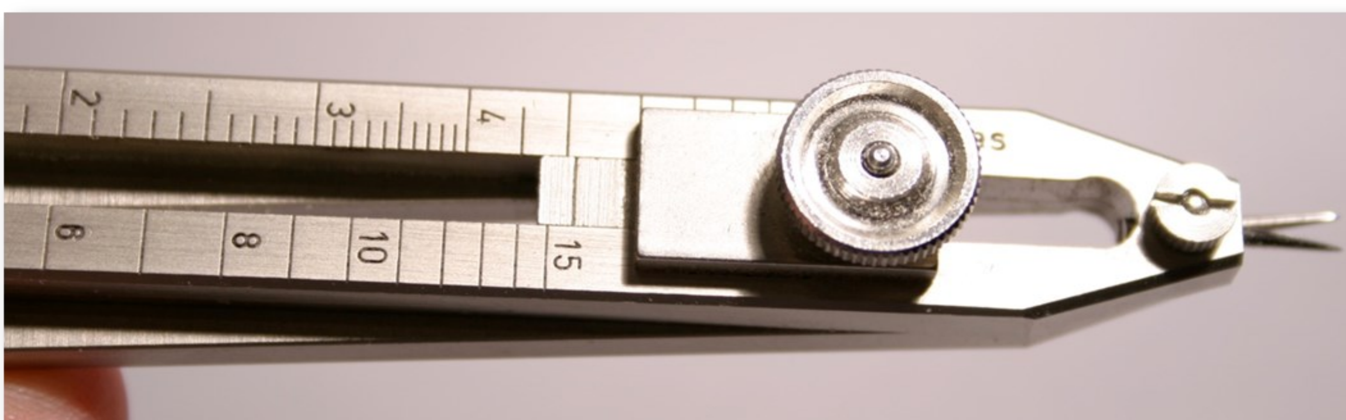


Photo 7

You will notice that the dividers have a locking screw in the center. It has a piece of metal attached to it with a horizontal line across.

On each arm of the dividers is a scale. The scale on the bottom arm is the scale that is used to set up the proportion of planks in a given area to the width of one plank in that measured area. By loosening the thumb screw and sliding the center line up to the number 6 on that bottom scale, you have set the proportion of planks to 6:1. The thumb screw is then tightened thus locking the dividers to the proportion of 6 to 1.

With the proportion set, you open the dividers and use the wider end to set the dividers to the width of six planks as shown in Photo 6 on the previous page. Make a mark on the center bulkhead at that position as shown in the photo. Then move the dividers aligning the top point on that mark so that you can mark the location of an area that is the width of six more untrimmed planks. Repeat that process down the same bulkhead until you can make no more marks on the bulkhead.

For this next step, you will need to soak the six planks in water. If you made more than six marks on the center bulkhead, you will need additional strips, one for each mark. I use a plastic tray I purchased at Lowes that is typically used to soak wallpaper. It’s not quite 2’ long but is long enough to soak most of a length of typical planking stripwood. Capillary action will cause the water to seep into the portion of the stripwood that might stick out of the water.

In Photo 8, I have attached one of these wet strips to the hull of my model. The bottom edge of the strip was placed on the first line I marked with my proportional dividers.

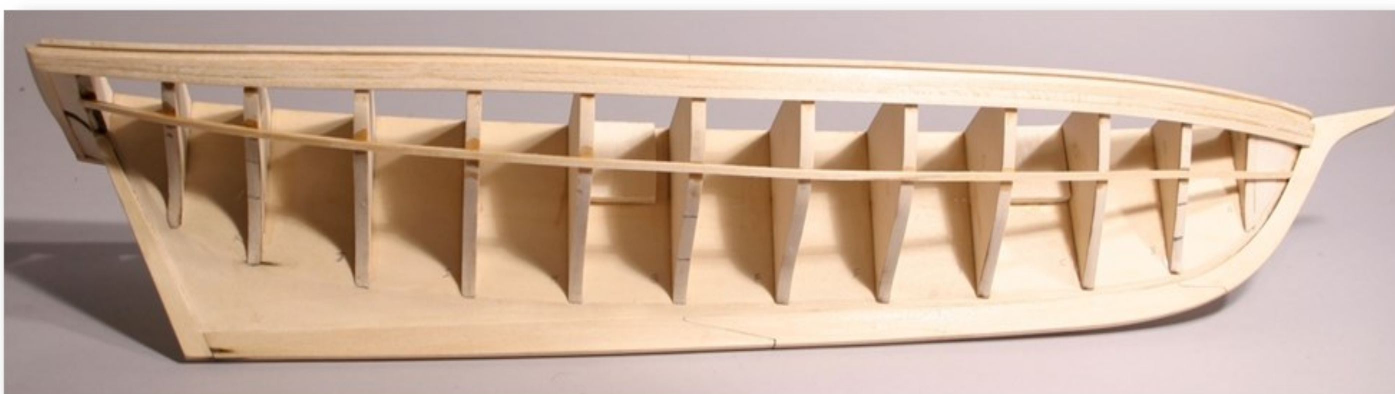


Photo 8

The plank was not tapered at either end. However, the important point I want to make is that the plank was laid in a natural manner. That is to say, I allowed the plank to lay without any side to side pressure that might put any stress on the wood as I glued it to the bulkheads using Zap-A-Gap. This plank will eventually be removed. It is what is called a **batten**.

At the bow, you can see that the space between this plank and the planks above it is narrower than it is at the center of the hull. At the stern the area is also narrower than at the center.

Photo 9 on the next page shows additional planks laid at each mark I made across the center bulkhead. Each of those planks was positioned so that it lay naturally across the hull as well.

Photo 9

These strips were commonly used on real ships to help determine the shapes of the planking across the hull.

You are now ready to analyze the shape of your hull by first viewing the space between these battens at the bow, center and stern areas. As you can see, the lower ***belt area*** is much wider at the stern than it is at the bow and center area. When this occurs, ***stealer planks*** will be needed to fill in the gaps between the planks that will form when you lay the individual rows of planking. (I will show you how to make and install those stealer planks.)

In the second belt area, the bow area appears to be very narrow when compared to the center area of that belt. This indicates that a ***joggle plank*** may be needed at the bow in that belt.

The other areas at the bow are narrower than the center area, but it appears to me that the planks can simply be tapered to fit all six planks in those belts.

The stern area of the third belt from the top also appears to be wider than the first and second belt. Therefore, it will probably be necessary to use a stealer plank in that belt.

The stern area of the first and second belt appears to be narrower than the center area of those belts. Therefore it will be necessary to taper the planks some so that all six planks in the belt will fit.

What I have just pointed out to you is my analysis of the shape of this hull. The battens allow you to visually see where you will need to taper planks, add stealers, or use joggle planks. Even though I have not yet explained how to make or use a stealer or a joggle plank, the battens show you where such planks will probably be needed, and at this stage of planking the hull, that is the most important step in the process.

Here is where the proportional dividers come into play. Earlier I explained how to set up the dividers by loosing the thumb screw and sliding that part up to align it's center mark with the bottom scale at the number 6 for a proportion of 6 units to one unit. After locking the dividers in that position by tightening the thumb screw, you opened the dividers and set the wider open end to a width of 6 planks. Now, by adjusting the width of the larger open end to the width of the space between the battens at any given bulkhead, you can flip the dividers around and use the narrower open end to mark the width of the plank on that bulkhead. This is because the thumb screw you tightened when you set the dividers will now give you a measurement at the narrower end that is exactly 1/6th of the width of the open space in the belt when measured using the larger open end. That is why they are called proportional dividers.

In Photo 10, I have adjusted the width of the larger open end to fit between the two battens at the bow in the first belt at the first bulkhead.

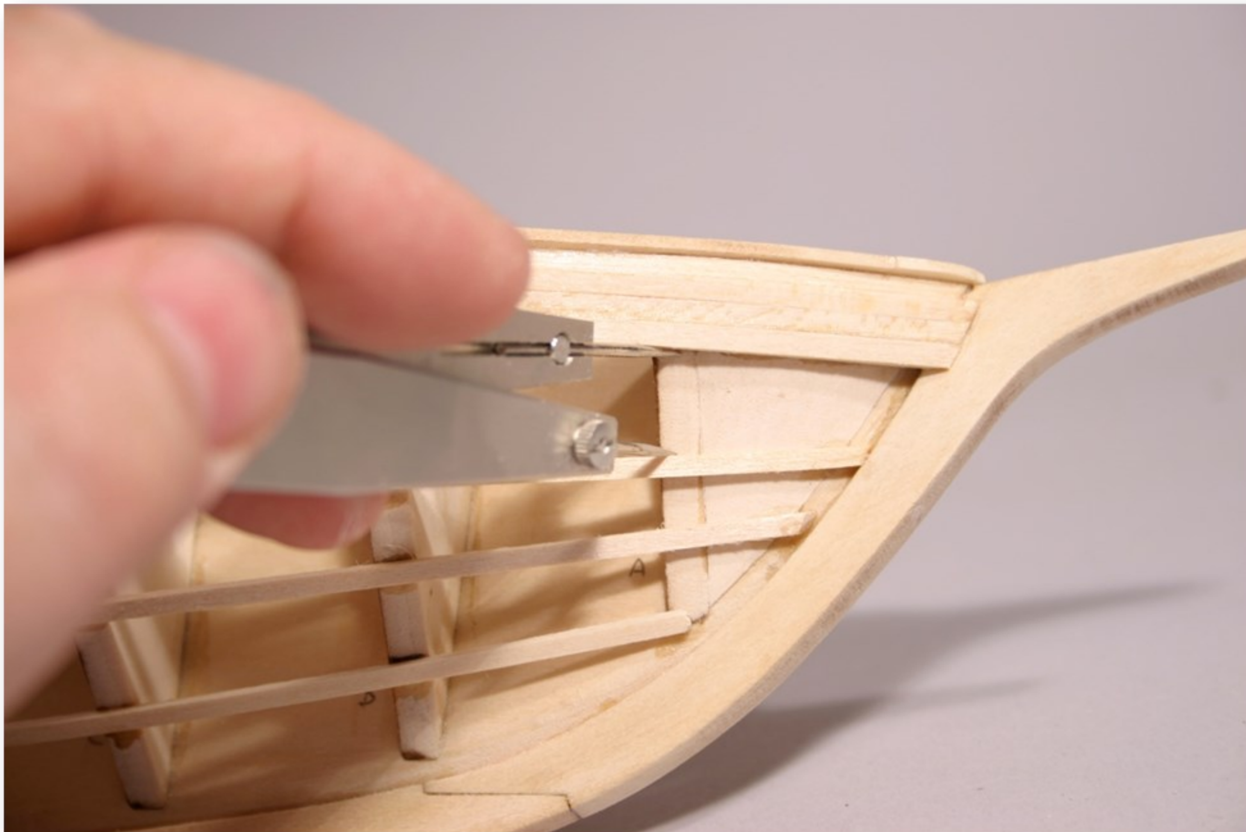


Photo 10

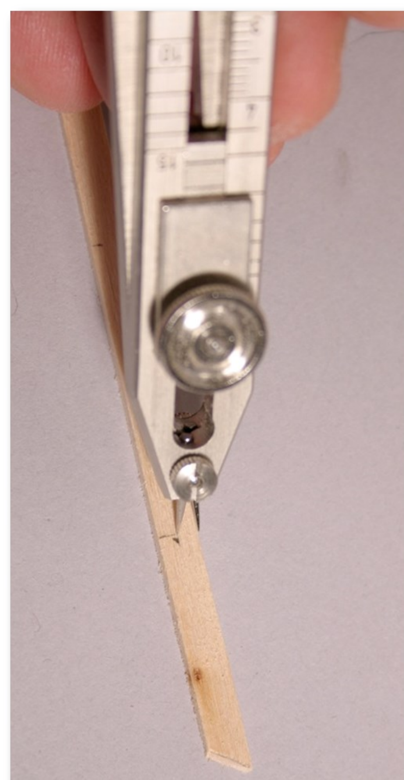


Photo 11

In Photo 11, using the narrower open end of the dividers, I then placed one point on the outside edge of the plank and marked the location of the other point at the location of bulkhead one.

Before doing this step, the plank must be set against the hull so that you can mark the location of each bulkhead on the plank. Use the center bulkhead that you first marked as your reference point as you hold the plank in position. What I do is first bevel the end that will fit into the rabbet joint at the bow. As the planks sweep upward at the bow, this bevel angle increases. The bottom edge of the plank will be tapered on the various marks that will be measured using the proportional dividers.

After you have marked the location of each bulkhead, or even every other bulkhead depending on how close together your bulkheads are, you can connect the markings using a ruler to draw a line across the plank which will indicate the taper of that plank. After the taper line has been marked, you simply trim off the excess wood along the bottom edge of the strip using a #22 X-acto knife blade. Smooth out the edge with a sanding block before gluing the plank in place.

Photo 12 shows the tapered plank installed at the bow.

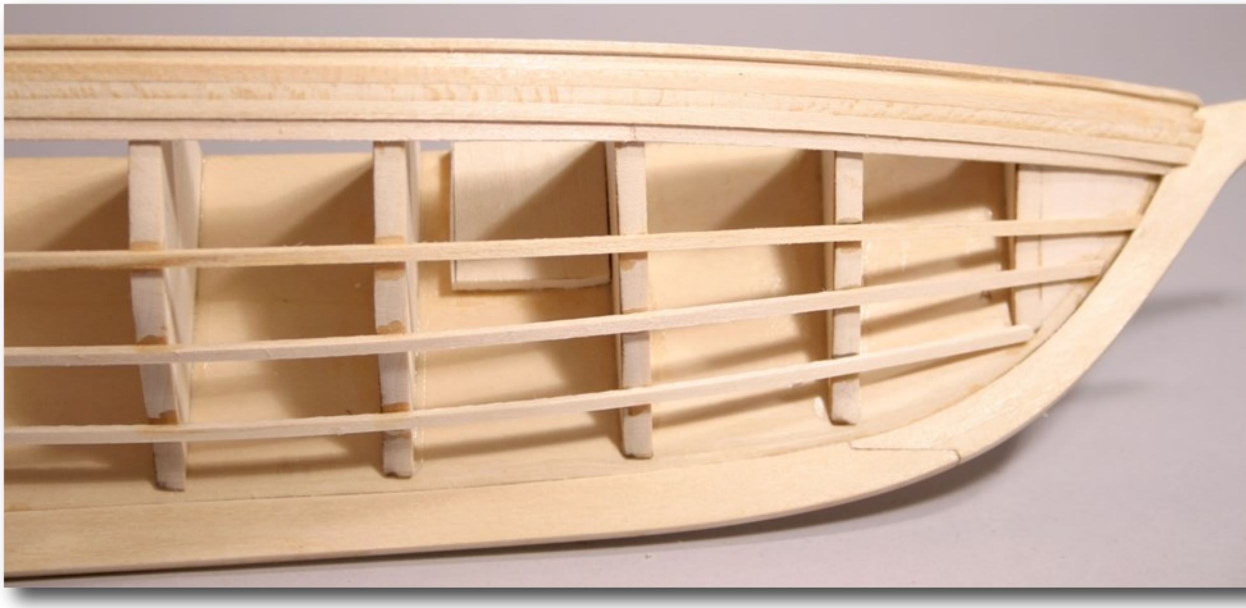


Photo 12

Photo 13 shows the same plank at the stern. No taper was cut at the stern end of this plank. As you can see, the batten and the upper planking at the stern are parallel to each other so no tapering of the planking at the stern is necessary in that particular belt.

You should also notice that there is a plank that is perpendicular to the sternpost that the hull planks butt up against. The space between that plank and the already planked counter area is the lower counter area. The lower counter area has a filler block in it. Also, the last bulkhead gives the hull planks a surface to be glued to.

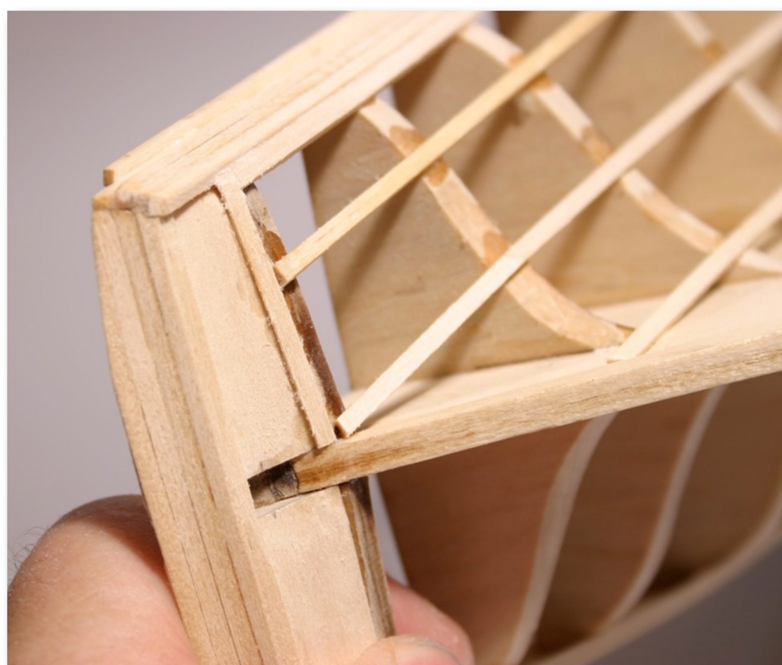


Photo 13

All of the planking is applied using Zap-A-Gap. Because the planks are wet, the super glue will take hold very quickly. It is best to apply the glue to a single bulkhead at a time. Depending on the end grain of the wood in the bulkhead, it may be necessary to apply the glue several times. Exposed end grain will cause the thin glue to seep into the wood quickly and dry. You can see dark areas on the aft bulkheads where this soaking action occurred so it was necessary for me to apply the glue several times until the glue puddled long enough to press the plank down against the bulkhead.

You can also see in this photo how each plank lies flat against the bulkheads. That is the importance of fairing out the bulkheads after they have been glued to the center keel and before adding any planking.

After the first plank in the belt has been laid, the proportional dividers must be adjusted to change the proportion to a ration of 5 to 1, because you have space for only five more planks between the last laid plank and the batten below it.

In Photo 14, several more planks have been tapered and glued to the bulkheads in the first belt area.

Photo 14

As you can see, I have used smaller cut strips to plank this bow area. Because I knew that the planks did not need tapering at the stern, I started each row from the stern and laid the planks going forward. To make it easier to shape and fit the final tapered area at the bow, I ended the full plank on a bulkhead close to the bow and completed the row with a small piece of planking and staggered each butt joint by one bulkhead.

This photo shows that there is still room for three more planks, however the bow area is getting narrower. This is something you will need to watch for. If it appears that the remaining opening is getting too narrow, a joggle plank may be needed. I will cover the joggle plank in a moment.

Photo 15

In Photo 15, you can see that the first belt has been completed. If you count the planks, you will see that there are six planks. Before the last plank was added, the batten was removed. Remember that the battens were aligned with their lower edges on the marks you made with the proportional dividers.

Looking at the shape of the openings at the bow for the 3 belts that remain, it tells me that I will need to taper the planks at the fore end for the second and third belt and possibly leave the planks in the fore area of the lowest belt their full width.

Often I will begin planking the hull from the keel up once some of the upper planking has been installed. The belt closest to the keel is the belt that will most often need stealers.

A stealer is a special plank that is inserted between two rows of planking to fill a space left when the natural lie of the upper row of the two rows sweeps upward. Remember, I said earlier that you do not force the lie of the planks when planking a hull. The planks must lie naturally across the hull. It's okay to make minor adjustments to the run of the planks, as you are not putting sideways pressure on the plank in an attempt to force it to go the way you want it to go.

Typically the planking on a ship will sweep upwards at the stern and the bow. This upward flow is called the sheer of the ship. You can see this upward flow in Photo 9 shown earlier. That photo also shows that, from the bottom edge of the lowest batten to the upper edge of the keel, the space to fill with rows of planking increases at the stern.

Photo 16 shows how I handled this wider space in the lowest belt.

Photo 16

As you can see, the plank was not wide enough at the stern to flow upward and still reach the keel. I trimmed away a portion of the plank so that I could install a stealer plank in the gap that was formed.

The second row of planking also has a stealer plank at the stern. These stealers help to maintain the upwards sweep of the planking and bring the top edge of the second plank closer to being parallel with the batten above. As I view Photo 17, I can tell that I will still need at least one more stealer plank to complete the area from the keel to the lowest batten.

In Photo 17, I have added another row of planking in the lowest belt.

Photo 17

A third stealer was added underneath the third row of planking. As you can see, I have now removed the remaining battens, and if you look closely at the flow of the upper planking compared to the flow of the lower planking, you can see that the planks are nearly parallel to each other.

You must re-evaluate your own hull planking each time you add another row. Adjustments can be made to improve the flow of the planks without putting excessive sideways pressure on the planking to achieve a smooth upward flow of the planking at the bow and the stern.

Sideways pressure means the plank is being forced to bend sideways against the grain. The grain in the wood flows end to end. Each plank is anchored to the hull at each bulkhead where it is glued. Over the length of the plank, a certain amount of sideways pressure can be applied without creating excessive force on the wood.

You should be laying each plank in a test fit first to see how the plank wants to lie naturally. If you ever see that the natural lie of the plank creates a wide gap at the stern, and that gap is greater than the width of a plank, then some sideways pressure on the plank is necessary to reduce the gap to no more than the width of a single plank. By spreading this sideways pressure out over the area of the plank where the gap begins, you reduce the risk of forcing the plank into a very unnatural sideways bend.

Remember that your planking will be wet from soaking in a tub of water. This will make it very easy to create the flow upwards at the stern and bow. Seldom will you need to taper a plank at the stern from the bottom edge of the counter down to the keel. This area is what I call the stealer zone.

In Photo I18, you can see that I have begun closing the gap between the lower planking and the upper planking by using planks that are approximately 6” in length. Each plank ends at the center of a bulkhead and the butt joints are staggered. In essence, I am following the standard planking rule that there are at least three rows of planking between rows where the butt joints are on the same frame.

Photo 18

The shorter planks are easier to shape and install, and it provides a certain degree of historical correctness. On this particular model, the hull has only one layer of planking and the model is painted entirely on the outside.

You may not have noticed, but each photo shows that I have sanded the hull after each plank was added. By sanding the planking as you go along, you will achieve a smoother hull and will be less likely to need wood filler. For a single planked hull, this is very important.

Let's look at Photo 19 on the next page. This photo shows the stern area of this model. As you can see, the planking is nearly finished. However, this photo also shows a typical situation that crops up at the stern when stealers are used. The problem area is that upper curved area in the open part that has not been planked yet.

Photo 19

If you look at the edge of the row of planking just above the opening, you can see that the plank has a curve towards the keel at the last bulkhead. If another plank is laid against this one, I will either need to force that plank into an unnatural bend to make it fit tightly against this last row of planking, or I will need to leave a small space for another very small stealer.

The solution to this problem is to use a straight edge such as a ruler and draw a pencil line from the end where the plank meets the stern post, to a point forward of this end. Thus the edge of the plank can be trimmed, removing the curved area at the last bulkhead.

In Photo 20, I have trimmed away that curved area. Now, the next plank flows more naturally and no gap is left between the two rows. The remaining area to be planked can easily be filled in without any difficulties.

This is all part of the analysis of a hull. The analysis begins when you lay battens across the hull in five or six plank belts. As your planking progresses, adjustments must be made as you analyze the remaining open areas on the hull. Each time you add another row of planking, you should re-evaluate the remaining opening to see what adjustments can be made to keep the flow of the planking upward at the stern and bow while not forcing any planks into an unnatural bend.

Photo 20

On the next page, Photo 21 shows the completed planking on the starboard side of the hull at the stern. Notice that from the bottom edge of the counter where it meets the sternpost, the hull required several stealers to fill in the gaps left by allowing the planks to lie naturally.

Another very important point I want to make is that you can see that the surface of the lower hull planking is flush with the surface of the sternpost. This is very important. Never will the surface of the planks be higher than the surface of the sternpost in this area. The rabbet joint should be deep enough to allow for this to happen naturally. If you ever find that your planks lie higher than the sternpost surface in this area, your rabbet joint in the stern deadwood is not deep enough and should be adjusted. The deadwood is that area below the bulkheads that do not reach the keel. This area will always appear at the stern.

This example is for a hull that has a single layer of planking. If you are planking a hull with two layers, then the surface of the first layer of planking should actually be lower than the surface of the sternpost because the added thickness of the second layer has to be taken into account.

Photo 21

Earlier I mentioned that I would show you an alternative method for determining the shape of the planks without the use of proportional dividers. The method I've always used is quite simple. Working from the center bulkhead outward toward the bow, cut strips of paper about 1/4" in width. Place a strip on the center bulkhead so that it's end edge meets the bottom edge of the last plank laid. With a pencil, mark the point where the strip intersects the batten that defines the bottom of the belt you are filling in. Do this at every other bulkhead with separate paper strips and label them with numbers that coincide with the number of the bulkheads.

You should see that the distance to each mark on each strips becomes less and less as you move towards the bow. Now, using a ruler or calipers, measure this distance on each strip and divide the measurement by the number of rows of planking left to be fitted in that belt area. This will give you the width of the plank at every other bulkhead. You can transfer those measurements and trim the plank accordingly.

Over the years of building model ships, I simply "guesstimated" the shape of each plank based on my experience. I knew that the planks had to be tapered at the bow, and stealers had to be used at the stern. I seldom ever tapered a plank to a width less than half the width of the plank itself. In the end, this guesstimation worked out, and the hull of my model was covered.

Hulls with Plywood Sheeting

Some kits are using cutout plywood pieces to form the upper bulwarks area of the hull. There are many examples of such models - the HMS Pegasus, HMS Fly, and HMS Vanguard by Amati. The Bluenose II, Swift, and the Mayflower by Artesania Latina, and the HMAV Bounty by Caldercraft. These plywood pieces often have gunports cut out of them which require some additional framework on the inside surface to increase the thickness of the bulwarks. Your kit plans should give you measurements from the top of the bulkheads to the bottom edge of the plywood piece at different locations across the hull.

Often these pieces will have to be bent. The only way to bend them without breaking them is to soak them in a tub of water. I often soak mine overnight so that they are easy to bend. I will usually use some of the small brass nails in the kit to secure the pieces to the bulkheads. I use CA super glue to glue them.

Photo 22 shows the plywood sheets on the HMS Vanguard kit by Amati.

Photo 22

The inner bulwarks on the port side has been planked with the same stripwood used for the first layer of planking. It was then painted red, which is typical on a British warship.

As you can see, there are several pieces of cutout plywood attached to the bulkheads with small brass nails. These nails were left in the bulkheads and planked over when the second layer of planking was applied. This is very typical on larger models, however, I have seen older designs such as the Panart HMS Victory kit that do not use plywood pieces like these. Those are what I call "old school" kit designs, and they are much more difficult to build.

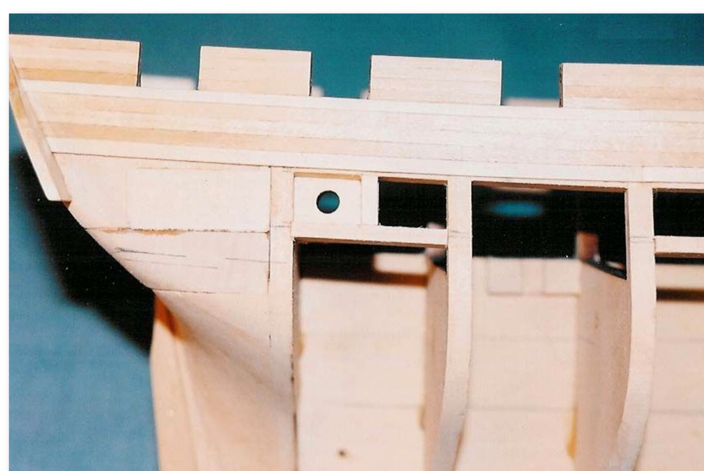


Photo 23

Old school kits use stripwood to form the upper and lower edges of the gunports. Model Shipways USF Constitution is another example of an old school kit as shown in Photo 23.

This kit uses strips of basswood glued between the bulkheads to frame the gunports. Another piece of basswood forms the side of the gunport. These gunports have false cannons that are inserted and glued into the hole seen in the photo.

If you have a kit that does not include plywood parts, your kit's instructions and plans should show how to frame any gunports that exists. Typically such framing will involve the use of stripwood that you must cut and fit between the bulkheads similar to the gunport shown in Photo 23.

Seldom are these plywood parts planked over during the first layer of planking. I will cover the second layer of planking which almost always covers such parts in a future article.

Joggle Planks

I have shown you how to create stealers. Stealer planks are applied at the stern of the ship where the natural lie of the planks flows upwards leaving gaps between the rows of planking. Now I will explain and show you how to make joggle planks,

Joggle planks are sometimes needed at the bow of the ship. A joggle plank is used when two rows of adjacent planking will end at a sharp point or at a point short of the stem and rabbet joint. Photo 24 shows a good example of a joggle plank.

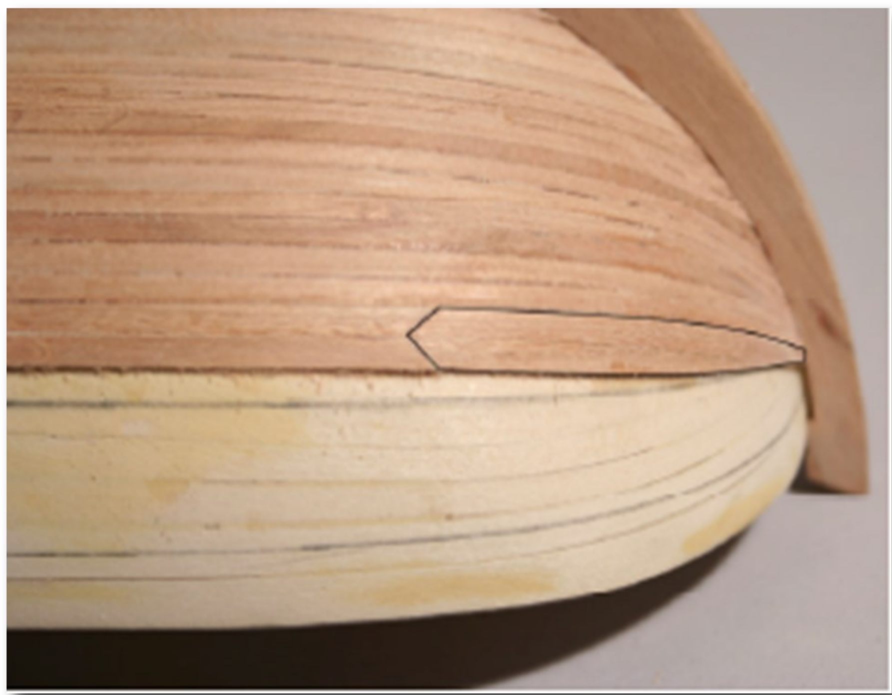


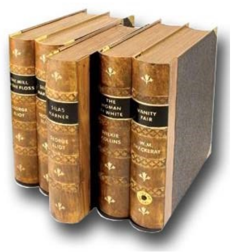
Photo 24

As this photo shows, the flow of the planking is such that the two adjacent rows that meet the joggle plank would come to a sharp point if they extended to the rabbet joint. To alleviate this situation, the joggle plank provides a natural taper at the forward end where it meets the rabbet joint. At a point on the hull where the two rows of planking can meet the joggle plank at their full width, the joggle plank is cut at angles on each side of its centerline to form a wide point. The two planks are cut on an opposite angle so that they can butt up against the joggle plank. This would leave sufficient wood on the two planks for a treenail.

The most common type of hull that will require one or two joggle planks is one with a blunt bow. A blunt bow is one which has an abrupt curvature to it, and the planking must turn nearly ninety degrees to meet the stem. You can clearly see that the area where the first layer of planking meets the stem at the upper end is at a ninety degree angle to the stem as shown by the blue arrow in the photo above. This is typical of a blunt bow ship.

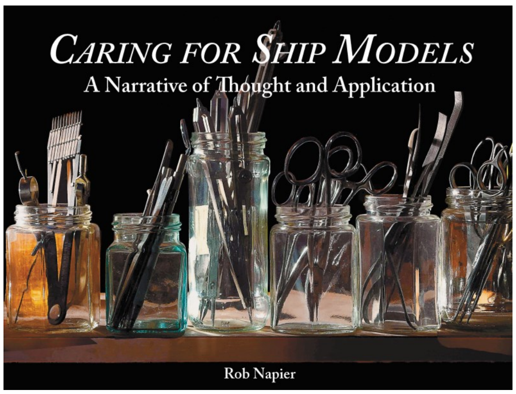
The Pride of Baltimore model I showed in the section on hull analysis had a more streamlined shape at the bow. That type of hull will always require that the planks be tapered; but no joggle plank will be needed because the taper of each plank leaves sufficient wood for treenails, should you wish to use them.

In the next issue we'll look at preparing the hull for and laying the second layer of planking.



The Book Nook

Books of interest for the Model Ship Builder



Caring for Ship Models, A Narrative of Thought and Application

Author: Rob Napier

Format: Hardcover

Language: English

ISBN: 979-8-9862370-0-8

Publisher: Seawatch Books

Pages: 186

Most are familiar with scale model ships, whether they be from personal collections or from important institutional collections such as the Thompson Collection at the Art Gallery of Ontario in Canada, the collection of the US Naval Academy Museum in the U.S.A. or the largest collection in the world of scale model ships at the National Maritime Museum in the U.K.. On the other hand, few are probably familiar with those who maintain these important historic objects. From their regular care and conservation to in some cases full restoration of models that have fallen into bad disrepair.

Rob Napier is one of those unique individuals and through his book Caring for Ship Models, A Narrative of Thought and Application, Napier provides the reader with a deep insight into the world of model conservation/ restoration based on his experience.

This book is broken down into four sections. The prolog in which Mr. Napier provides the reader with a brief background into his history working with ship models, as a model builder, repairer, restorer and conservator throughout his career.

In the second part of the book Mr. Napier provides the reader with his personal perspectives on working with ship models. Thus, giving the reader an understanding of how and why he approaches each project, and what his primary initial goals are when looking at models.

Part three of the book is really the heart of the book for those interested in the How-to business of repairing models. Napier takes you through the process he uses to evaluate potential commissions supported by his reasoning for doing so. He further discusses the tools and equipment he uses and in cases where they don’t readily exist discusses some of the forms he creates to conduct his repairs.

In the last section of the book Napier provides 29 case studies of various influential projects he's work on in his career. Each study starts with some background information about the model and its builder. It then goes into his observations of the repairs needed and then describes how he approached each repair.

This book is very well laid out and written, with a large number of reference images throughout the book and will be of great interest to not only modelers wishing to take care of their own models but also other conservators and restorers of models.

Genes Nautical Trivia

Ship Names

S	Q	D	O	O	H	V	D	Q	W	A	S	A	M
S	W	I	F	T	A	C	I	R	E	M	A	T	A
O	N	S	L	B	C	O	O	C	U	S	X	N	T
R	O	Y	U	V	I	T	A	H	T	I	O	I	T
T	I	R	X	R	I	S	A	L	C	O	D	P	H
A	T	E	A	N	P	N	M	A	R	R	R	N	E
B	U	N	O	N	N	R	U	A	U	F	L	Y	W
L	T	M	N	A	O	S	I	O	R	M	J	K	Y
A	I	P	H	H	T	Z	V	S	B	C	G	Z	T
E	T	R	B	I	K	A	I	J	E	M	K	E	N
L	S	I	C	M	E	G	T	R	E	L	A	Q	U
G	N	N	O	D	E	Y	B	E	A	G	L	E	O
A	O	C	N	E	G	N	E	V	E	R	R	N	B
E	C	E	K	C	U	I	R	U	O	S	S	I	M

ALBATROSS	HOOD	MISSOURI
CONSTITUTION	BOUNTY	VICTORY
WASA	SYREN	ALERT
BISMARCK	HANNAH	CAUSTIC
ENDEAVOUR	MONITOR	REVENGE
MATTHEW	FLY	BEAGLE
AMERICA	SURPRISE	PINTA
ARIZONA	PRINCE	SWIFT
EAGLE	DRUID	

Genes Nautical Trivia

John Paul Jones

Each letter in the phrase has been replaced by a number.

Solve this quote from by John Paul Jones

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

16 / 17-16-15-24-16-22-3 / 2-20 / 24-10-11 / 3-16-1-19 / 2-4-13-10-24 / 24-2

26-11 / 16 / 5-16-3 / 2-20 / 8-24-9-2-3-13 / 16-3-23 / 25-11-7-7

17-2-3-3-11-17-24-11-23 / 8-11-3-8-11, / 25-22-24-10 / 16

24-2-7-11-9-16-26-7-11 / 13-2-2-23 / 11-23-4-17-16-24-22-2-3, / 16

13-11-3-24-7-11-5-16-3, / 16-8 / 25-11-7-7 / 16-8 / 16 / 8-11-16-5-16-3

26-2-24-10 / 22-3 / 24-10-11-2-9-19 / 16-3-23 / 15-9-16-17-24-22-17-11.

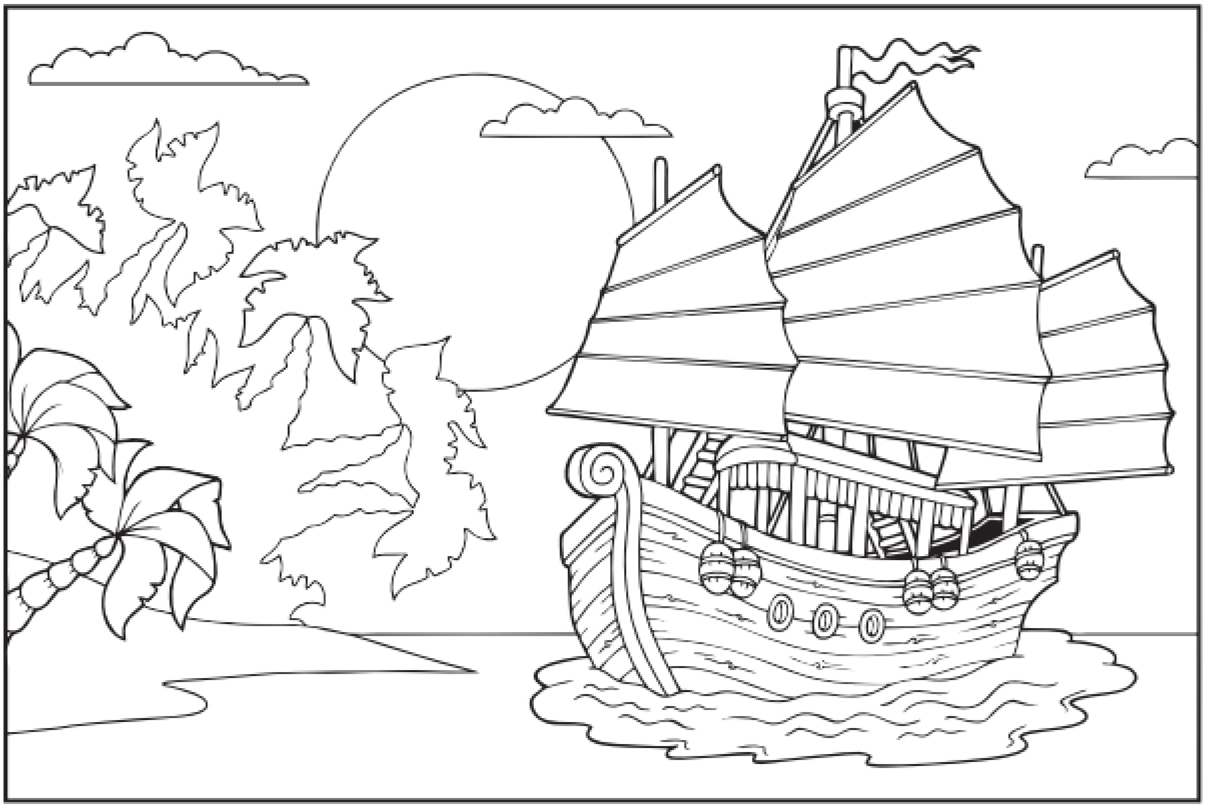
A Little Scrambled

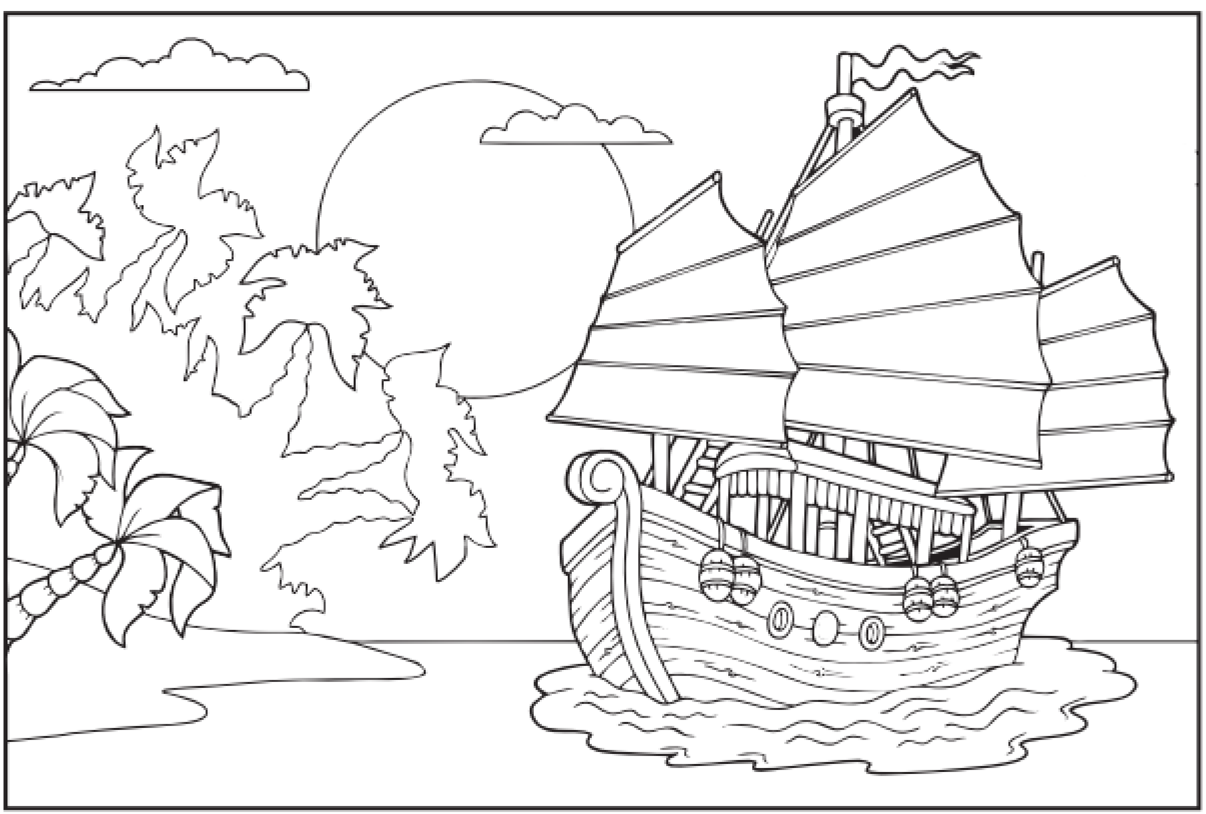
Unscramble the letters to find common nautical words

1. S A M A I I N L _ _ _ _ _ _ _ _
2. T M S A _ _ _ _
3. C R A H N O _ _ _ _ _ _
4. O P T R _ _ _ _
5. D S R R A A O T B _ _ _ _ _ _ _ _ _
6. Y L A L E G _ _ _ _ _ _
7. D E H A _ _ _ _
8. W B O _ _ _
9. N T S R N _ _ _ _ _
10. N C P A A I T _ _ _ _ _ _ _
11. C K E D _ _ _ _
12. T M E A _ _ _ _
13. L S I S A _ _ _ _ _
14. U K N B _ _ _ _

Find the difference

There are 10 differences between these pictures. Can you find them?





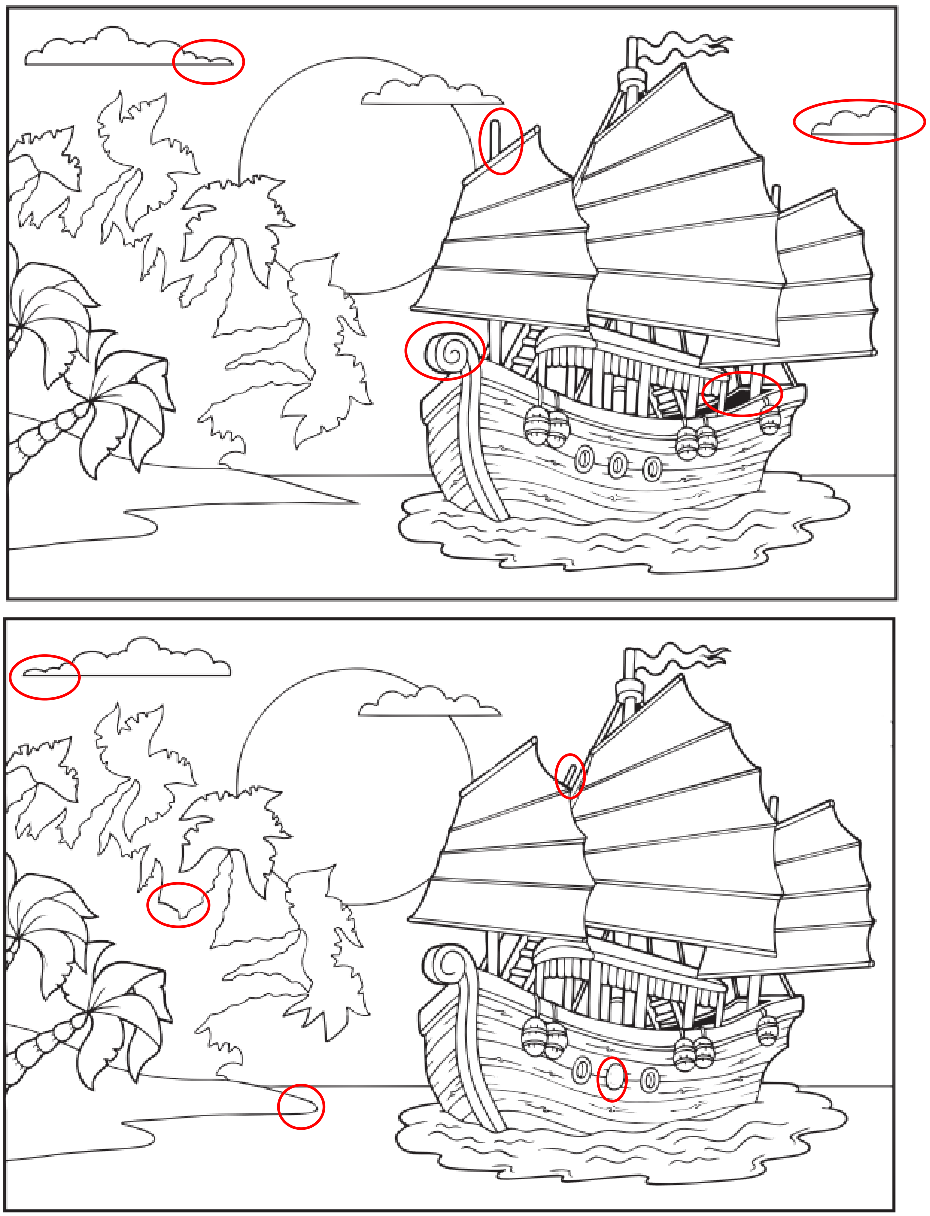
Genes Nautical Trivia

Answers

John Paul Jones

"A captain of the Navy ought to be a man of strong and well connected sense, with a tolerable good education, a gentleman, as well as a seaman both in theory and practice."

Find the Difference



A Little Scrambled

1. Mainsail
2. Mast
3. Anchor
4. Port
5. Starboard
6. Galley
7. Head
8. Bow
9. Stern
10. Captain
11. Deck
12. Mate
13. Sails
14. Bunk