Fitting-out and rigging a 74-gun model ship

Asistencia con la realización del aparejo

Francis Jonet

This guide is an help to the construction of the equipment of a ship model of the late XVIIIth and early XIXth centuries, but is applicable to any other era of wooden shipbuilding.
This work by Francis Jonet describes with hundreds of photos and sketches, the construction of his model, gold medal in 2010. A large number of images in the document are shots taken in macroscopic mode in order to show in detail how to set up the rigging of a 74-gun vessel.

COMPOSITION OF THE WORK

Book in A4 format of 128 pages in full color. (paper 150 grs and sewn)

CHAPTER I– Fittings and more
Tools - Laminates - The sandpaper file - Working on the stern and the stem - Making gratings - Upper-decks and poop-deck breastwork - The breast rail stanchions and belaying pins - Ladders - Shroud chains - Anchors - The guns - The figurehead - The stern lantern

CHAPTER II - The Masts
Making the spars - Lower mast and lower yard hoops - The yardarms - Building the tops - Topgallant trestletrees and crosstrees

CHAPTER III – Blocks
Preparing slats - Making the shells - Finishing the blocks

CHAPTER IV – Rope work
The workspace - Theory - In practice - Serving - Particular cases for small cables

CHAPTER V – Finishing the rope work
Eyes and mouse (stays) - Shrouds masthead rigging - Rope bights - The shrouds - Wall-knots - Ratlings - Hammock-nettings - To Clap-on blocks to the yards - Small block straps - The thimbles or rings - Hooked return blocks - The anchor buoys

CHAPTER VI – Making the sails
The cloths - Tabling - Linings and patches - Eyelets - Bolt-ropes, foot-ropes and head-ropes - Bolt-rope cringles - Reef-point - Gaskets - Grommets - The bent sails

CHAPTER VII – Installation of the sails
Leading and belaying the ropes - Jibs - Staysails - Lower sails - Topsails and mizzen topsail - Topgallant sails and mizzen topgallant - Driver - Jib sheets and installation of anchors - Finishing the installation of square sails - Staysails sheets - Inspection of the work done

CHAPTER VIII – The ship's boat
Construction method - The forms - Framing - Keel, stem and sternpost - Sterns - Planking - Form removal - Stern-sheets - Floor-timber, inner planking - Thwarts, stem and stern inner areas - Rudders - Finishing details

CHAPTER IX – Technical data
Making the ropes - Shrouds, back-stays, stays, preventer-stays, bowsprit mast - Catharpins, various, range-cleats / belaying cleats - Blocks, sheet-blocks,, staysail stays, bolt-ropes, foot-ropes, etc… - Fall tackles, yard-tackles - Sail tackles, anchor ropes and cables - Yard rigging - Lower sail clusters, blocks for the stays

CHAPTER X – Block distribution
Rigging parts for the masts and for the operation of the yards - Rigging parts for the operation of the sails - Rigging parts for the operation of the guns

CHAPTER XI – Return tackles
Forecastle - Quarterdeck - Poop-deck

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MASTS AND SPARS

Contrary to most advice from the specialized magazines I have in my possession (old paper magazines), which advocate fashioning mast and spars from square section lumber, by rounding the edges with a planer, file and sanding, these masts and spars were made using a lathe. A lathe adapted to be powered by a hand drill secured to the worktable and purchased at a standard hardware store.

Fashioning the spars

The technique is simple: we begin by marking the evolution of the spar's diameter and removing material[6], using a gouge or thin chisel, to obtain the determined diameter for each marking. This work must de done very slowly and lightly while removing very little material at a time and verifying the dimensions often, using a caliper: keeping a few hundredths of a millimeter extra until the next step. The different diameters being referenced, work continues using sandpaper: beginning with coarse and ending with fine to very fine paper. All spars are fashioned in the same manner. The smaller the diameter, the lighter the touch: and patience becomes the best tools for success.

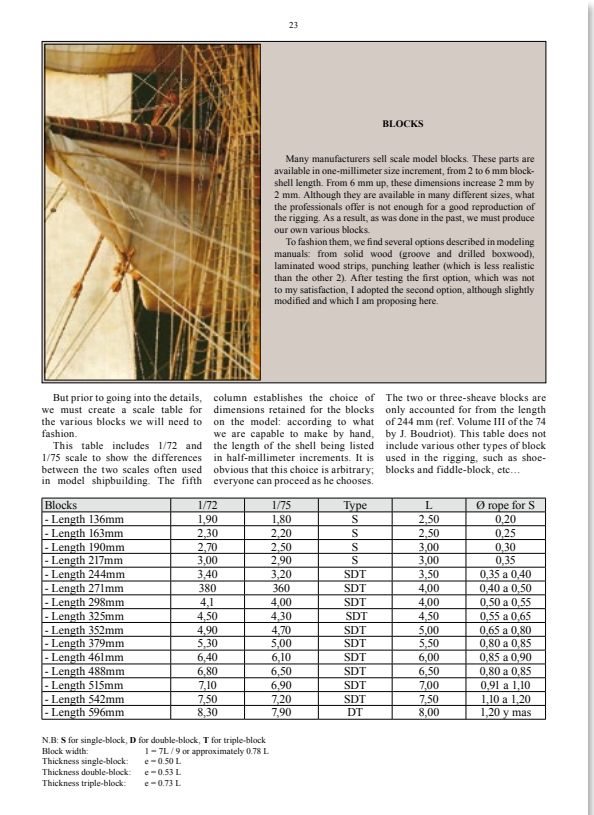
In regards to the topmasts and topgallant masts, the diameter of the lumber used must reflect the healing, which will be shaped once the mast has been turned. For example, the healing of the main topmast should be nearly 10 mm (side dimension) and offset from the mast's center axis: as a result the diameter of the lumber used should be 14 mm. The same applies for the yards and their reinforced middle section: unless you choose to add the healing and reinforced areas afterwards. The topmast hounds are fashioned in an identical way.

6 - According to the choice I made: ramin for the masts and walnut for the yards.

A view of the mainmast as it could possibly be seen from one of the ship's boat along the starboard side of the ship.

Marking the taper of a yard

Half of the mizzen top yard has been tapered.



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BLOCKS

Many manufacturers sell scale model blocks. These parts are available in one-millimeter size increment, from 2 to 6 mm block-shell length. From 6 mm up, these dimensions increase 2 mm by 2 mm. Although they are available in many different sizes, what the professionals offer is not enough for a good reproduction of the rigging. As a result, as was done in the past, we must produce our own various blocks.

To fashion them, we find several options described in modeling manuals: from solid wood (groove and drilled boxwood), laminated wood strips, punching leather (which is less realistic than the other 2). After testing the first option, which was not to my satisfaction, I adopted the second option, although slightly modified and which I am proposing here.

But prior to going into the details, we must create a scale table for the various blocks we will need to fashion.

This table includes 1/72 and 1/75 scale to show the differences between the two scales often used in model shipbuilding. The fifth column establishes the choice of dimensions retained for the blocks on the model: according to what we are capable to make by hand, the length of the shell being listed in half-millimeter increments. It is obvious that this choice is arbitrary; everyone can proceed as he chooses.

The two or three-sheave blocks are only accounted for from the length of 244 mm (ref. Volume III of the 74 by J. Boudriot). This table does not include various other types of block used in the rigging, such as shoe-blocks and fiddle-block, etc…

Blocks	1/72	1/75	Type	L	Ø rope for S
- Length 136mm	1,90	1,80	S	2,50	0,20
- Length 163mm	2,30	2,20	S	2,50	0,25
- Length 190mm	2,70	2,50	S	3,00	0,30
- Length 217mm	3,00	2,90	S	3,00	0,35
- Length 244mm	3,40	3,20	SDT	3,50	0,35 a 0,40
- Length 271mm	380	360	SDT	4,00	0,40 a 0,50
- Length 298mm	4,1	4,00	SDT	4,00	0,50 a 0,55
- Length 325mm	4,50	4,30	SDT	4,50	0,55 a 0,65
- Length 352mm	4,90	4,70	SDT	5,00	0,65 a 0,80
- Length 379mm	5,30	5,00	SDT	5,50	0,80 a 0,85
- Length 461mm	6,40	6,10	SDT	6,00	0,85 a 0,90
- Length 488mm	6,80	6,50	SDT	6,50	0,80 a 0,85
- Length 515mm	7,10	6,90	SDT	7,00	0,91 a 1,10
- Length 542mm	7,50	7,20	SDT	7,50	1,10 a 1,20
- Length 596mm	8,30	7,90	DT	8,00	1,20 y mas

N.B: **S** for single-block, **D** for double-block, **T** for triple-block
Block width: 1 = 7L / 9 or approximately 0.78 L
Thickness single-block: e = 0.50 L
Thickness double-block: e = 0.53 L
Thickness triple-block: e = 0.73 L

All the eyes and eyelets needed in our rigging will be make in the same fashion, served rope or not.

Making the stay mouse is similar to serving rope: as explained in the previous chapter, except that this time, we voluntarily compound the turns to give the mouse its oval shape to simulate its real appearance. It is not very accurate, but I have not found a better solution working at this scale. The thread used is the "famous" glaced cotton (gloving cotton thread 120).

Shrouds masthead rigging

Everyone will understand how to make the head rigging loops. Following serving the cable over adequate length in its center portion, an eye is formed and tied as indicated above. In regards to the first mainmast shrouds, which are single shrouds on either side of the mast, we must add a short piece of cable tied in the center to form an eye.

Rope bights

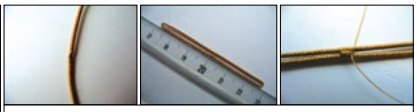
We will often need to fashion various sizes closed rope-rings (loops) for our rigging: be it for block straps, yard-slings as well as many other parts of the rigging. The following description is suitable for all, every diameter and for ropes that are served or not served. The following description is suitable in every case, for all diameters, for rope served or not. The only obstacle is the size of the ring: for diameters under 6 mm, it becomes extremely difficult, if not impossible. Evidently, this work must be done under a magnifying glass.

Once the size is determined for the needed ring, the length is marked on a rope using a fine point felt-pen[14]. Then, each marking is covered with cyanoacrylate over a few millimeters to stop the rope.

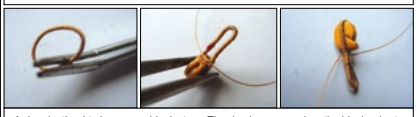
From these two markings, two beveled cuts are applied in the same direction (the longer the bevel, the better). The rope is then shaped into a ring with the two beveled cuts being joined. A drop of glue is then applied to the joint, which is held in place using tweezers until the glue is dry: the ring is closed! Various finishes are required according to the use of the ring: for example, in the case of a yard pendant or the strap for their halyard blocks, we need to tie a binding around the glue point to reinforce the joint, which will be further held by a layer of fabric glue to complete the work. This judiciously placed binding will look very realistic on the model. In the case of small straps, such as the spritsail yardarm blocks, it is better to use the tie and serving to hide and reinforce the glue point.

We will proceed in the same manner for the yard lifts. As for the very small blocks and short strapped blocks, another method is to be used: but we will cover that later.

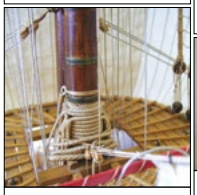
This older image shows the winding-tackle and main-tackle pendants, as well as the first mainmast shrouds: a rope entirely served, this first shroud includes an added piece of rope to form the masthead eye.



This is the ring of a "long fish-strap" for an anchor. The rope serving remains intact due the application of glue to the bevel cuts. The fit is checked prior to binding and the result is adequate.

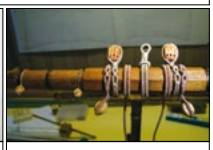


A ring destined to become a block strap. The ring is squeezed on the block prior to preparing the lashing. The lashing is completed for the block, which will end up on the spritsail yard.



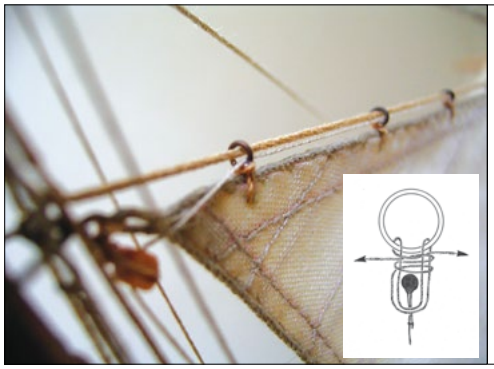
The mainmast head rigging.

Here are the blocks and other elements, which will be installed at the ends of the main yard.



A view of the center area of the foreyard: halyard blocks, topmast sheet blocks, slings...

14 - Using a red pen makes it clear and visible.



This close-up image, taken from1 cm away, allows a better view of tied grommets: running through both sides of the bolt-rope and two the turns lashing, crossing the thread, then glue and cut extra thread.

The rope passing through the grommets under the stay is the jib's downhaul.

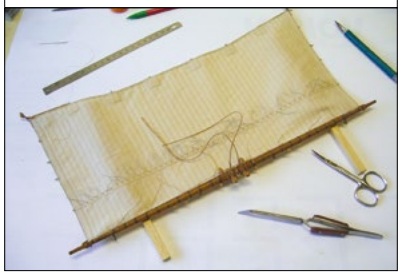
The bent sails.

First, the various blocks required to rig the sails are fitted to the yard, the foot-ropes are in place, only the elements destined to be fitted at the extremity of the yard still need to be installed. A support adjustable in length allows us to hold the sail upright (this support was used while setting the blocks and foot-ropes). The sail is temporarily held in place over its entire width. Installation begins at the center, the tension of the rope-bands is uniform to prevent distortions in the cotton fabric: these distortions would be a detriment to the aesthetic of the entire assembly. The rope-band is located right in the center of the yard: on the forward face. The ropes run twice through the eyes, passing between the sail and the yard, and are stopped by a knot located at the back (lower area of the yard).

The head-earrings and rope-bands are represented by only one doubled rope (a thread 0.15 mm in diameter, the same as other similar ropes: it is sufficient at 1/75 scale). After traveling through each of the two eyelets from the front, they form a sliding-knot, and then cross each other at the yardarm, and end by a full wrap before being tied.

This work is does not take place using the support but is done flat on the worktable. In regards to the yards fitted with their studdingsail irons (which are necessarily in place), they must be protected to avoid breakage. We must place the yard over two holding blocks, laid flat. They must be thicker than the length of the irons: it is not ideal but better than not taking any precautions. The mainsail will need 58 rope-bands: every one of them is an opportunity for damages.

The mainsail is shown while being installed on the yard. This work is not complicated but it is delicate work due to the presence of the studdingsail irons.



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One last trick: if your spouse or companion likes sewing, let her do this work : she will have fun and you won't have to do this difficult and tedious task.

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Jib sheets and installation of anchors

Prior to installing these sheets, we must set the best bower and sheet anchors in their final position onto the channel on each side. The number of tackles made fast on the forecastle led me to wonder how this would have been done in reality; and what options could be adopted by the crew at the time.

It would seem that the first step in getting a ship ready to set sail from anchorage, is to raise the anchor(s). The sheets for the jibs end on each side of the ship, along the forecastle bulwarks near the beakhead bulkhead, either on the deck or coiled[27] to the timberheads to free the space in the area. Theoretically, the sheets could be made fast over the anchor tackles, the anchor shank-painter, which depending on what disposition is adopted, could be tied to the same timberheads.

Installation of the anchors:

If this work has not taken place yet, we must do it now.

All the anchor tackles are ready: the best bower long-fish strops are in place and tied to the anchor stock (the small anchors are not fitted with any as per the captain's decision), the cables are fitted to the anchor ring and the buoys are tied to the shanks.

Each anchor shank-painter is first fitted to a timberhead by a sliding knot, then through an iron bracket if the anchor is in position on the channel. From there it is wrapped several turns around the anchor shank and tightened before traveling back to the timberhead where it is made fast.

The ring-stopper travels through the anchor ring from the cathead prior to being stowed on the forecastle. They are made fast to the closest

FOREMAST

Returns on large range-cleats:

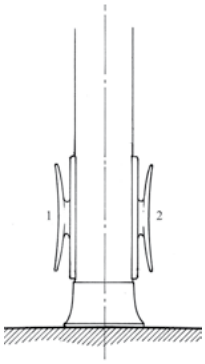
1 and 2- For each cleat, in this sequence:
1) Lashing of the lower yard halyard and stowage in their tubs.
2) Lashing and stowage of the truss-tackles.
3) Lashing and stowage of the fore leech-lines.

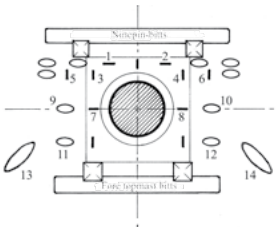
Using the eyebolts at the foot of the mast:

1- Main topmast preventer-stay tackle.
2- Main topmast stay tackle.
3 and 4- Lower yard truss-tackles.
5 and 6- Foretopgallant sheets return-blocks.
7 and 8- Fore leech-lines return tackle blocks.

Returns on range-cleats at the foot of the mast:

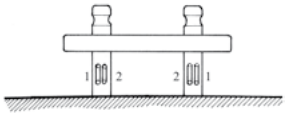
9- Middle staysail downhaul.
10- Main top staysail downhaul.
11- (free)
12- Main topgallant staysail downhaul.
13 and 14- Lashing of the cat-fall.





Returns on the Fore topmast bitts:

1- Passage of the fore top sheets and their lashing to the uprights.
2- (free).



Returns on the ninepin-bitts:

1- Fore top ref-tackles.
2- Fore top buntlines.
3- Fore top leech-lines
4- Fore buntlines.
5- Fore buntlines.
6- Inner-jib halyardDrisse du conte-foc.
7- (free)
8- Standing-jib halyard.