TRANSLATION LINKS

1. type into your browser ... **english+italian+glossary+nautical terms**
2. utilise the translation dictionary 'Nautical Terms & Expressions' from Euromodel website

An *interpretive* review of the Friedrich Wilhelm zu Pferde

17th. Century German Frigate

Launched 1684

Scale 1:48

Checked the *Essential* Resource Information File ?

02.HULL CONSTRUCTION

January 2023

My *interpretive* review is based on the supplied drawings, the kit material – and an amount of extra material.

This work only illustrates how this ship might be built.The level of complexity chosen is up to the individual

This resource information was based on the original text supplied by Euromodel and then expanded in detail as the actual ship was constructed by the author, Peter Coward. Neither the author or Euromodel have any commercial interest in this information and it is published on the Euromodel web site in good faith for other persons who may wish to build this ship. Euromodel does not accept any responsibility for the contents that follow.

*This is **NOT** an instructional manual but illustrates my own interpretation based on the drawings and the supplied kit.*

- Additional material used was dictated by my own personal choices.
- Greater simplification would be achieved by using the material as it is supplied.

Reference Texts

Historic Ship Models by Wolfram zu Mondfeld (1989)
Seventeenth Century Rigging by R.C. Anderson (1955) [almost a complete copy of his earlier book ***The Rigging of Ships in the Days of the Spritsail Topmast, 1600 – 1720*** (1927)]
The Construction and Fitting of the English Man of War 1650-1850 by Peter Goodwin (1984)
The Masting and Rigging of English Ships of War 1625 – 1860 by James Lee (1984).

[To navigate through the contents – use 'control + click']

Contents

Illustrations

[The figures below are not hyperlinked]

Chapter 1: ARMAMENT

There are a number of consideration to be taken into account before proceeding with this section

- Prior to first planking of the hull & forming the gun ports, complete gun carriages with barrels mounted (albeit, some temporarily) need to be constructed for the three different sized carriages to check the height of the opening above the deck.

- Gun carriages need to be fixed on a deck surface before being covered by an overlying deck *(gun barrels later being inserted through the gun port opening)*

    1. *all 20 carriages on gun battery deck before the main deck installation.*
    2. *10 of the 18 carriages before the quarter and forecastle deck installations.*

- The more serious builder will blackening the brass cannons. A link is provided in the interim but after some research, more will be posted about this aspect

    https://shipsofscale.com/sosforums/threads/brass-blackening.11280/#post-287554

- Three different gun carriage lengths – 35, 27 & 21 mm.

    1. **Gun Deck** - 20 x *18 pounders*: 55 mm. cannons + 35 mm. carriages
    2. **Main Deck** - 18 x *12 pounders*: 50 mm. cannons + 27 mm. carriages
    3. **Forecastle/Quarter Deck**s – 10 x *9 pounders*:45 mm. cannons + 27 mm. carriages
    4. **Upper Quarter Deck** - 4 x *9 pounders*: 38 mm. cannons + 21 mm. carriages

- Basic powered tools considered necessary included …
    1. scroll saw
    2. bench mounted sander

Gun Carriage Construction

The following diagrams (taken from the drawings) have been highly simplified in that the majority of measurements are not shown. This has been done so that the kit/ scratch builders can concentrate on the dimensions that they may wish to alter utilizing the carriages & wheels provided.

Some builders will go with the carriages as they are supplied without any modification.

The choices are …

- ***as supplied***
- ***modification***
- ***scratch***

The supplied carriages differ markedly from that shown in the plan sheets and if some research is done, it may well be decided that after all the effort in building the hull so carefully, far more time should be spent in creating a more authentic carriage.

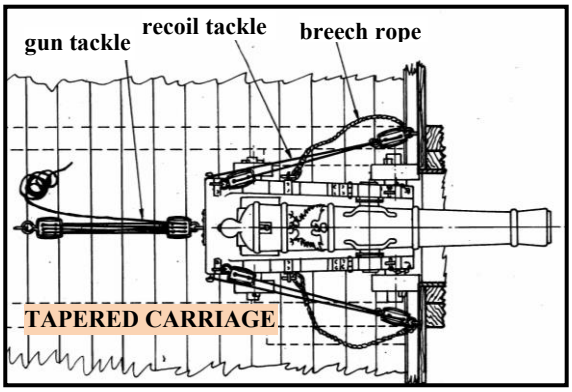
Many of the 'completed' guns would not be visible at all. Considerable time & effort was put into the carriage construction knowing that they would not be seen … but there was satisfaction from having built the full structure.

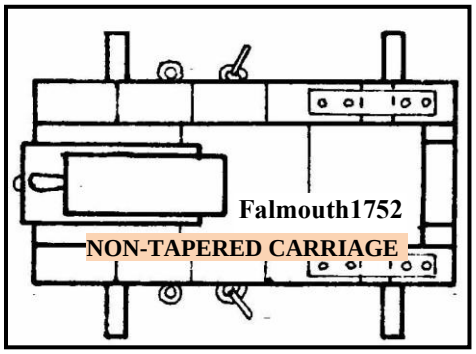
Plan Sheet 3 allows for the gun carriages that are not visible on both the main deck & gun battery deck by using 'block' carriages designed to support the cannons. You can elect to construct these or just make the completed gun carriage whether it is visible or not. To simplify this issue, the kit *does* contain the necessary carriage forms, trucks, axles to build all the carriages in their 'complete' form. How 'complete' you wish to make them is indicated in the following diagrams.

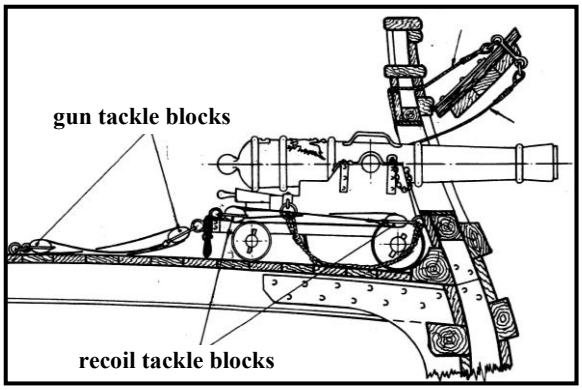
Gun Carriage Rope Suggestions

	Gun Deck (mm.)	**Main Deck (mm.)**	**Quarter Deck (mm.)**	**Upper Quarter Deck (mm.)**
braces	1.5	1.0	0.75	N/A
gun tackle	0.75	0.5	0.4	0.25
recoil tackle	1.0	0.8	0.6	0.4
blocks				

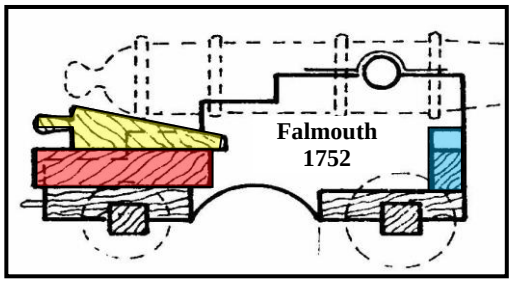
18th. Century Guns & Carriages

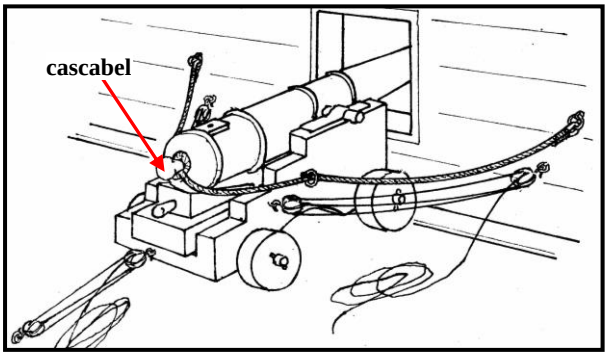






Pink: bed
Yellow: quoin
Blue: Transom





The breech rope was clinched to large ring bolts on the bulwarks and taken around the cascabel. The cascabel originally referred to the round knob at the breech end of the gun. However, the diagrams above only show the breech rope attached to the carriage sides and this only serves to show how much variation there was between ships and over time.

Figure 1: Guns and Carriages

Figure 2: Cannon & Carriage; *Standard Kit Build*

Alternative 1: Carriages From Kit Material
Fig. 2 illustrates the possible outcome of using kit material as supplied without any changes.

Alternative 2: Modified Carriages (using supplemental material)
The plan sheets give so much detail as to carriage constructional outcomes that the creation of a form that had more historical accuracy was worthwhile.

The pages that follow show the changes that were carried out to make a structure similar to that shown in the plan sheets. Refer to Fig. 2 below.

Figure 2 shows standard kit builds for cannon & and non-tapered carriages at a normal kit level and the overall result is acceptable.

In the diagrams on the previous page it can clearly be observed that the typical carriage consists of two vertical sides ('***cheeks***') joined by two horizontal ***axle trees*** as well as the ***quoin*** used for adjusting the inclination of the cannon seated on a '***bed***'. Then, you should look at the use of ***ring & eye bolts.*** Carriages are hauled to and from the bulwarks via ***three tackle systems*** – these may or may not be included in the build. There are differences in the tackle systems utilized in England and those on the Continent but it was decided to adhere to that shown in the plan sheets.

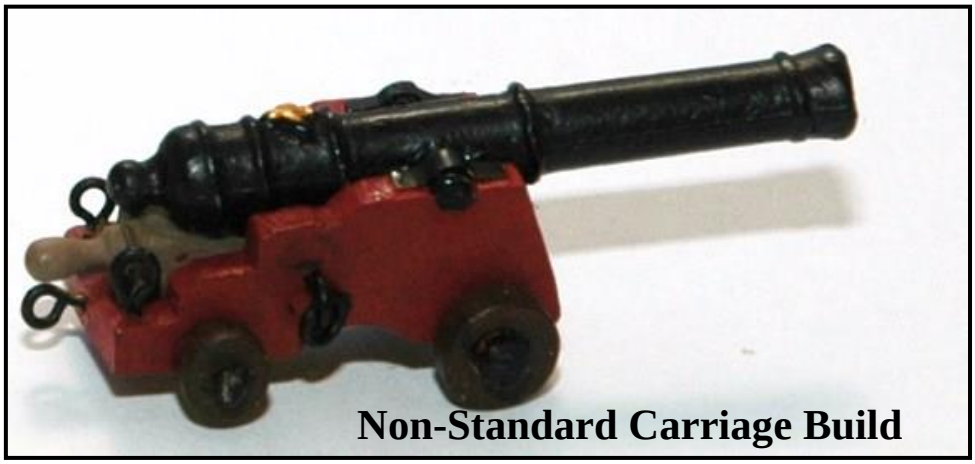


Figure 3: Cannon & Carriage; *Non-Standard Build*

Battery Deck Guns

20 guns [‘53’ mm. cannons + 35 mm. carriages]

***The easiest approach for a basic build is to use the carriages as they are supplied*.**

In this build, the following alterations were made …

- ***height*** (of the ‘cheeks’) varied, 13.7+; the height was reduced by approx. 2 mm. by removing the top step at the front and then **producing a slight concave depression to accept the cannon trunnion,**

- ***width*** varied, 16.3+; given the need to taper the carriage and that it would be difficult to increase the maximum width to 18 mm., so it was decided to make the taper based on 14-16 mm. (rather than 16-18 mm.) which accepted the trunnions more effectively,

Figure 4: Quoins

- increasing the width of the ***axle channels*** to 4 and 3 mm.,
- increasing the ***hole diameter*** in the 7 mm. wheel to 3 mm.,
- angle for the ***leading edge of the cheek,***
- construction of the ***quoins*** (cannon wedges) – see opposite - and supporting ***beds,***

- construction of the axle and wheel assemblies (***axle trees*** and ***trucks***). Determination of length allowed for extension past the width of the wheels since cotter pins were inserted into the axles to hold the trucks in place.

Lengths cut depended on the actual width of each carriage …
for the front axle: carriage + wheels + projection = +/- 14 + 8.7 + 2.6 = +/- 25.3 mm.
for the rear axle: carriage + wheels + projection = +/- 16.0 + 5.0 + 2.6 = +/- 23.6 mm.

- addition of ***eye bolts*** and ***ring bolts*** could be carried out but ***trunnion bands*** cannot be used due to the insertion of the cannon barrels at a later stage through the gun ports. Note than none of these items are supplied in the kit.

Possible Construction Details

Battery Deck Carriages

STEP 1: Front axle channel was made wider on the base to 4 mm. and the rear to 3 mm.

STEP 2 : Cut down the centre line of the carriage with a fine-bladed jig saw.

STEP 3: Sanded the cut edges so that combined the carriage is 14 mm. at the front and 16 mm. at the rear.

STEP 4: Reduced the gun carriage height down to 12 mm. which then caused the cut-out supports for the gun barrel truncheon to be reformed – see photo opposite. To fit within the original cheek section, the steps were altered so that they were 2 mm. deep and 4 mm. wide. The latter dimension was a little smaller than that shown in the plan sheet (approx. 5 mm.).

STEP 5: Cut wheel axles of length +/- 23.6 mm. (rear) mm. and +/- 25.3 mm.(front) from supplied wooden rod (both lengths make an allowance for what would be cotter pin fitting). Slight chamfering of the ends of the axles prevented the wheels – which are a tight fit – from cracking.

STEP 6: Glued the two half sections of the carriage down onto the two axles.

STEP 7: At the front, created an angled slant on each cheek.

STEP 8: Painted the carriage dark red.

STEP 9: Glued on the two front wheels (7.5 mm. supplied but plan describes 9 mm.) wheels and the two 7 mm. wheels at the back. **N.B. before sliding wheels onto the axle, tested for a tight fit - often utilizing a round file to increase the wheel hole diameter**.

STEP 10: Created a quoin (wedge-shaped block) to support the rear of the barrel and glue in place. The interior maximum depth from the plan sheet was 6.0 mm. Using this figure, calculated the depth of bed.

STEP 11: Determined the inclination of the cannon required and utilized a template to maintain uniformity with all the carriages whilst gluing in the quoin. The photographs on the next page illustrate what was used.

STEP 12: To hold the barrel in the correct position when inserting the barrel through the port hole, it was decided to include the transom detail – many would argue this was an unnecessary step !

Gun Barrel Alignment onto Carriage

Fig. 5 shows a section of cannons placed on the gun deck from another ship. This illustrates the importance of building all the supporting carriages to a standardized method such that when the actual cannons are inserted through the gun ports and glued in position, all will project outwards at the same angle and be in the same relative position in each gun port opening. The following pages illustrate the care taken BUT the final outcome is yet to be seen! The ***deviating red line*** in Fig. 5 shows what can easily happen.

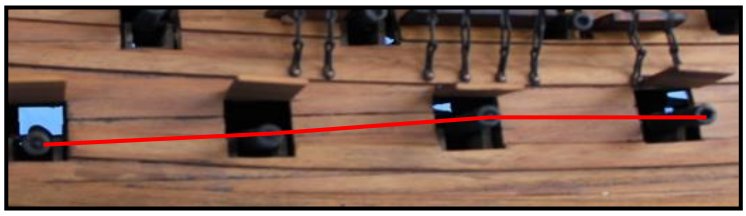


Figure 5: Importance of Standardising Carriage Construction

A template (rough, but it did the task required) was set up on a small piece of plywood …

1. Central dark red strip aligns front trucks (wheels).

2. Light brown block aligns distance barrel projects out from carriage.

3. Green block aligns inclination of barrel on carriage & position of quoin under barrel.

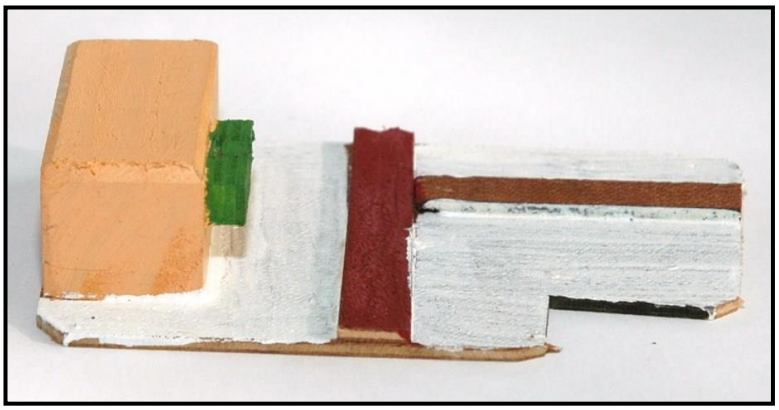
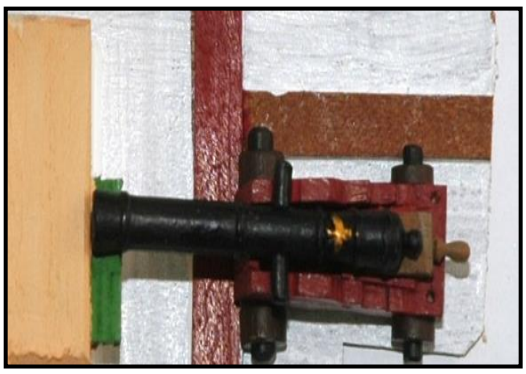
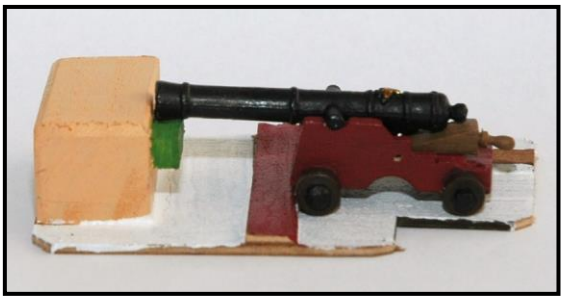


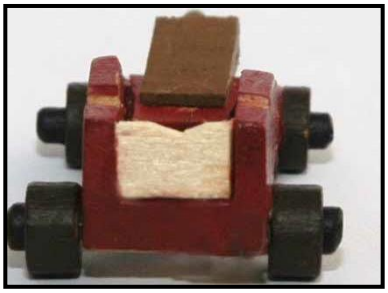
Figure 6: Template for Producing Cannon Inclination



BARREL PROJECTION:
Barrel sits on small green block against larger light brown block. Any adjustments to position of trunnions can then be carried out.



BARREL INCLINATION:
Barrel sits on small green block against larger light brown block. This allows quoin to be inserted & fixed in position



TRANSOM INSTALLATION:
A small section of first planking strip was glued in position and after fixed, the top surface was adjusted to fit front of barrel – transom –trunnion – quoin alignment. Here s suitable cut has been made which will then be smoothed to fit the barrel curvature.

Main Deck Guns

18 guns [‘48’ mm. cannons + 27 mm. carriages]

The easiest approach for a basic build is to use the carriages as they are supplied.(Figure 7 shows the visible guns on the Main Deck and they are non-tapered !)

The following alterations were made …

- ***width*** of the ***27 mm.*** carriage was smaller than in the drawings. A cut was made down through the center line to create a taper of ***13.8 – 12.6 mm.*** which still accepted the cannons neatly. A considerable amount of work for a small taper but it still looked better than the original supplied carriage,
- increasing the width of the ***front axle channel*** to ***3 mm.,***
- increasing the ***hole diameter*** in the ***7 mm.*** wheel to ***3 mm.,***

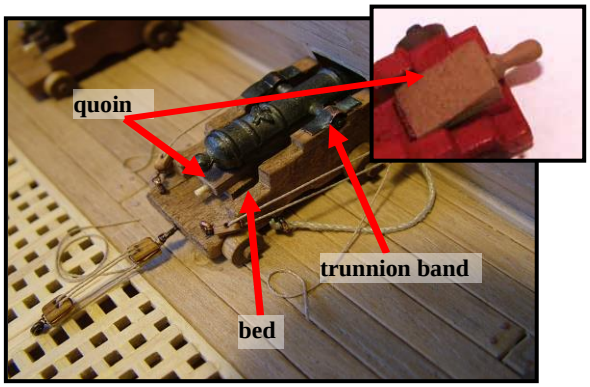


Figure 7: Main Deck Gun; *Non-Standard Build*

- angle for the ***leading edge of the cheeks***,
- construction of ***quoins*** (cannon wedges) and ***beds***,
- ***trunnion bands***,
- construction of the axle and wheel assemblies (***axle trees*** and ***trucks***). Determination of length allowed for extension past the width of the wheels since cotter pins were inserted into the axles to hold the trucks in place.

Lengths cut depended on the actual width of each carriage …
front axle: carriage + wheels + projection = +/- 12.8 + 5.0 + 2.6 = +/- 20.4 mm.
rear axle: carriage + wheels + projection = +/- 13.8 + 5.1 + 2.6 = +/- 21.5 mm.

- addition of ***ring & eye bolts***,
- creating ***trunnion straps*** to hold the cannon in place. Suitable sections were cut from a piece of brass ‘shim’ that was ***0.005 mm.*** thickness. Painstaking task but the appearance is well worth the trouble.

Possible Construction Details - Main Deck Carriages

STEP 1: Widen the front axle channel on the base to 3 mm.
STEP 2 : Cut down the centre line of the carriage with a fine-bladed jig saw.
STEP 3: Sanded the cut edges so that combined the carriage is 12.6-12.8 mm. at the front with minimal removal from the rear.
STEP 4: Unlike the previous carriages, the height and steps in the cheeks remain the same.
STEP 5: Cut wheel axles of length +/- 21.5 mm. (rear) mm. and +/- 20.5 mm.(front) from supplied wooden rod (both lengths make an allowance for what would be cotter pin fitting). Slight chamfering of the ends of the axles prevented the wheels – which are a tight fit – from cracking.
STEP 6: Glued the two half sections of the carriage down onto the two axles.
STEP 7: At the front, created an angled slant on each cheek.
STEP 8: Painted the carriage dark red.
STEP 9: Glued on the two front wheels (7.0 mm. supplied but plan describes 8 mm.) wheels and the two 6 mm. wheels at the back. **N.B. before sliding wheels onto the axle, test for a tight fit – often needed to utilize a round file to increase the wheel hole diameter**.
STEP 10: Created a quoin (wedge-shaped block) to support the rear of the barrel and glue in place. The interior maximum depth from the plan sheet is 9.5 mm. Using this figure, calculate the depth of bed.
STEP 11: Determined the inclination of the cannon required and utilize a template to maintain uniformity with all the carriages whilst fixing the quoin (refer to the previous photo).
STEP 12: A transom was constructed at the front of each carriage.
STEP 13: Added any further hardware (such as rings and trunnion bands) as deemed necessary.

Only EIGHT gun carriages visible on the Main Deck when ship complete.

Gun rigging is historically correct but the majority of kit builds will not show this degree of detail.

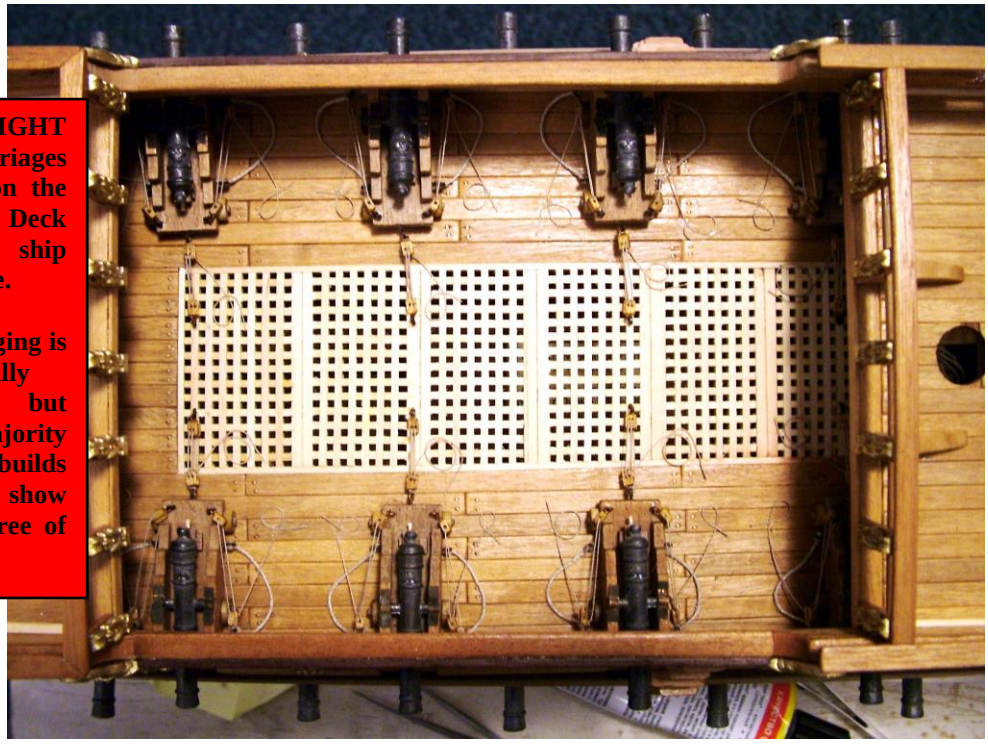


Figure 8: Visible Main Deck Guns

Forecastle & Quarter Deck Guns
10 guns ['44' mm. cannons + 27 mm. carriages]

The easiest approach for a basic build is to use the carriages as they are supplied.

The following alterations were made …

- ***width*** of the ***27 mm.*** carriage was greater than in the drawings so a cut was made down through the centre line to create a taper of ***13.8 – 12.0 mm.*** which still accepted the cannons neatly. A considerable amount of work for a small taper but it still looked better than the original supplied carriage,

- increasing the width of the ***front axle channel*** to ***3 mm.,***

- increasing the ***hole diameter*** in the ***7 mm.*** wheel to ***3 mm.,***

- angle for the ***leading edge of the cheek***,

- construction of the ***quoin*** (cannon wedge),

- construction of the axle and wheel assemblies (***axle trees*** and ***trucks***). Determination of length allowed for extension past the width of the wheels since cotter pins were inserted into the axles to hold the trucks in place.

Lengths cut depended on the actual width of each carriage …
front axle: carriage + wheels + projection = +/- 12.0 + 5.0 + 2.6 = +/- 19.6 mm.
rear axle: carriage + wheels + projection = +/- 13.8 + 5.1 + 2.6 = +/- 21.5 mm.

- addition of ***ring and eye bolts,***

- creating ***trunnion bands*** to hold the cannon in place. For these, suitable sections were cut from a piece of brass 'shim' that was 0.005 mm. thickness.

Possible Construction Details - Forecastle & Quarter Deck Carriages

STEP 1: Reduced the cheek width to approx. 2.2 mm.
STEP 2: Reduced the overall length to 24.5 mm.,
STEP 3: Reduced the height to approx. 9.5 mm.
STEP 4: Reformed 'slots' for trunnions,
STEP 5: Cut down the centre line of the base and creating a taper of +/-13.8 – +/-12.0 mm.
STEP 6: Due to the tapering, straightened out the front & rear axle channels.
STEP 7: Cut wheel axles of length +/- 21.5 mm. (rear) mm. and +/- 19.6 mm.(front) from supplied wooden rod (both lengths make an allowance for what would be cotter pin fitting). Slight chamfering of the ends of the axles prevents the wheels – which are a tight fit – from cracking.
STEP 8: Glued the two half sections of the carriage down onto the two axles.
STEP 9: Sanded the front & rear to form straight surfaces (necessary due to the tapering).
STEP 10: At the front, created an angled slant on each cheek.
STEP 11: Created a quoin (wedge-shaped block) to support the rear of the barrel and glue in place. The diagram opposite indicates the use of this wedge.
STEP 12: Painted the carriage before adding the wheels.
STEP 13: Glued on the four painted wheels.
STEP 14: Added any further hardware (such as rings & trunnion bands). The brass forming the trunnion bands required some very careful cleaning before being made up.

Quarter Deck Guns

Figure 9 clearly illustrates the effective use of basic carriage construction using the kit supplied material.

Figure 9: Quarter Deck Armament; *Standard Build*

Upper Quarter Deck Guns

4 guns ['35' mm. cannons + 21 mm. carriages]

The easiest approach for a basic build is to use the carriages as they are supplied – refer to Fig. 10 below.

Possible Construction Details - Upper Quarter Deck Carriages

STEP 1: Reduce the cheek sides and the base to approx. 2.2 mm.
STEP 2: Working on 27 mm. carriages, the overall length was reduced to 24.5 mm.
STEP 3: Reduce the height to approx. 9.5 mm.
STEP 4: Reform 'slots' for trunnions
STEP 5: Cut down the centre line of the base and creating a taper of +/-11.6 – +/-9.6 mm.
STEP 6: Due to the tapering, straighten out the front & rear axle channels.
STEP 7: Cut wheel axles of length +/- 19.3 mm. (rear) mm. and +/- 17.2 mm.(front) from supplied wooden rod (both lengths make an allowance for what would be cotter pin fitting). Slight chamfering of the ends of the axles prevents the wheels – which are a tight fit – from cracking.
STEP 8: Glue the two half sections of the carriage down onto the two axles.
STEP 9: Sand the front & rear to form straight surfaces (necessary due to the tapering).
STEP 10: At the front, create an angled slant on each cheek.
STEP 11: Create a quoin (wedge-shaped block) to support the rear of the barrel and glue in place. The diagram opposite indicates the use of this wedge.
STEP 12: Paint the carriage with your choice of colour (Euromodel suggests red).
STEP 13: Glue on the four wheels.
STEP 14: Add any further hardware (such as rings & trunnion bands).

Figure 10: Upper Quarter Deck Guns; *Standard Build*

Chapter 2: FIRST PLANKING *BELOW* MAIN DECK

Keel Tapering

When the *first* planking was finished, the plywood longitudinal keel needed a breadth of only 8 mm. at its lower edge – so that with the **second planking of 1.0 mm.** thickness walnut added over it, the final planked surface of the hull at the very bottom would be 10 mm. and hence continuous with the 10 x 10 mm. false keel. Some may choose to taper the plywood keel at this point – in this build, the taper was created *after* the first planking.

Planking – General Discussion

Frames 2 - 10: Temporary Sections

The pink-shaded section for the frames shown below are used to create the planking profiles for the Main Deck, Quarter Deck, Upper Quarter Deck & Forecastle Deck profiles but it seemed obvious that they needed to be removed after the planking was complete. ***(also refer to page 37)***

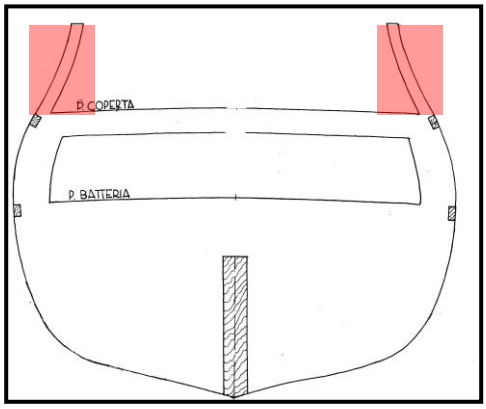


Figure 11: Temporary Frame Sections for Frames 2 - 10

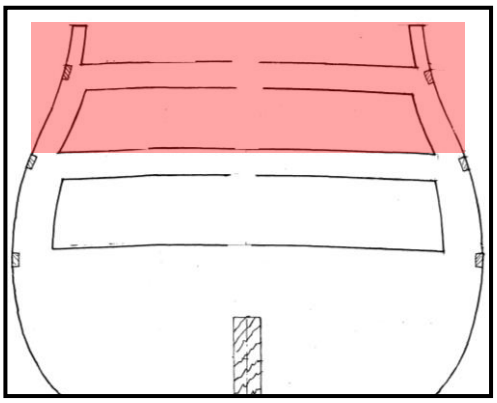


Figure 12: Temporary Frame Section of Frame 7

To make their removal easier, some 'non-stick' food wrap was placed over their respective edges before adhering the planks along the hull.

Figure 13: Using 'Non-stick' Food Wrap

In FW.01, there was a comment about the need to taper the keel before starting first planking.

Single First Planking

Given that this is essentially a kit construction, this ship would only consist of a single layer of first planking followed by a single layer of second planking on the outside.

Double First Planking

It is obvious from the drawings (Fig. 14) that the hull is of some considerable overall thickness. For additional strength, closer authenticity and gun port opening appearance, double first planking was used from the gun deck upwards. This was followed by a layer of second planking on the interior (as well as the exterior).

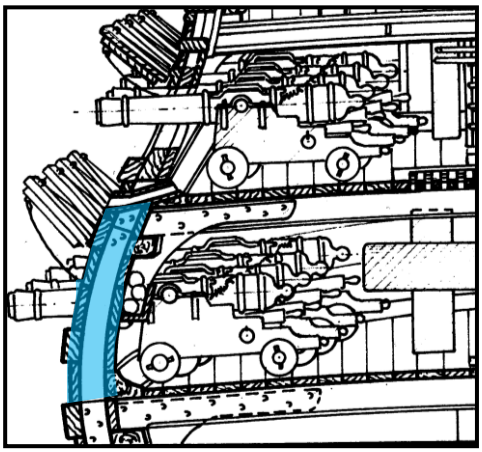


Figure 14: Hull Thickness

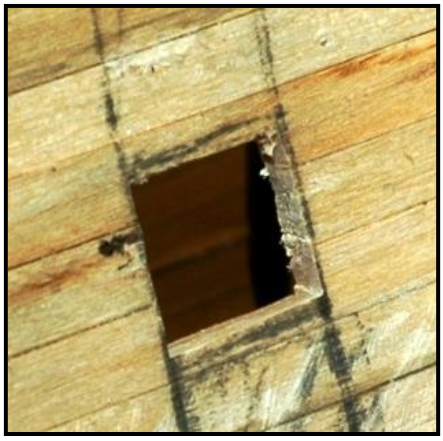


Figure 15: Double First Planking

Although extra work and ***much more material***, the double first-planking (Fig. 15) worked out well and something to be looked at again – even if it was only for the extra strength around the gun port openings.

The outer layer of first planking is a continuous strip of planking whilst the inner layer consists of a number of short lengths between the frames.

Many planks were able to be fixed WITHOUT tapering and here the use of brass nails driven half way in with a 'nail nailer' proved a useful technique. Sometimes the nails were more effective bent over flat with a small hammer. Either way, after the glue had set, there was no trouble withdrawing these nails with a pair of small long-nose pliers.

Starting the First Planking

The orthodox method usually seems to be to start the planking approx. halfway around the hull. However, with the ship inverted, planking was started from the keel and working 'upwards' [at this stage only a single layer of first planking was used]. Eventually, in order to complete the planking up to the bulwarks and beyond, this lower planking would create a base to rest the ship on in an upright mode in a normal cradle. As the photos below show, planking was also started from *halfway down the stringer immediately below the Gun Deck*. This will then ***allow a sound basis for determining the bottom/ top levels for the gunports.***

Figure 16: First Planking (clamps used to produce a more uniform surface)

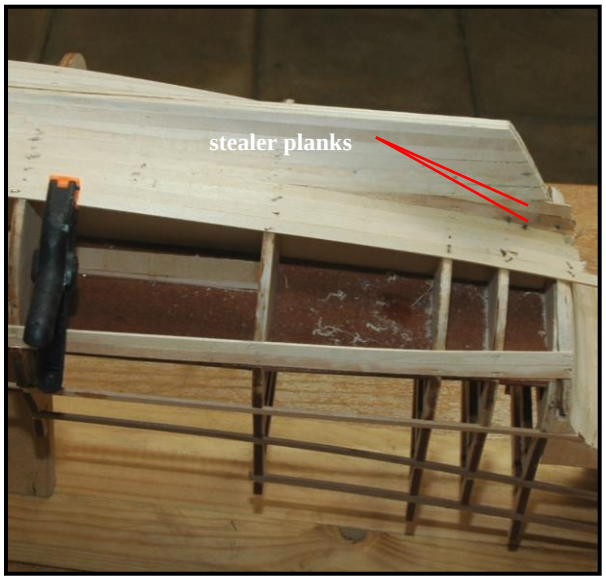


Figure 18: First Planking (showing use of 'stealers')

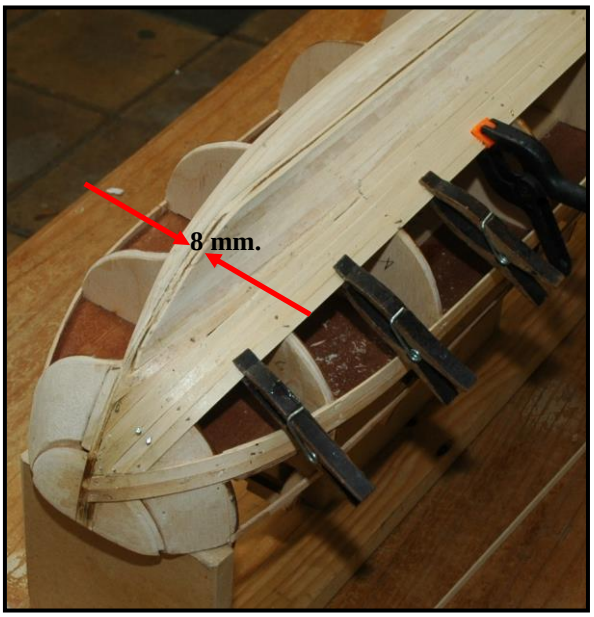


Figure 17: Combined Thickness of False Keel & First Planking

Figure 19: Plank Softening

Plank Softening & Fixing

Whilst the majority of the first planks below the gun deck *could* be fixed dry, some did need softening by soaking in water or a ***household form of ammonia*** first (e.g. 'cloudy ammonia'). With the fairly severe bending and twisting at the bow end, the softening for many planks proved essential. Ammonia solution was used in preference to the water!

For water soaking, a length of 90 mm. PVC storm water pipe was used sealed with a cap at the bottom and then filled with water. The width makes it easy enough to retrieve the planks being soaked. For ammonia solution, just the section necessary was soaked – often by just immersing in the original container.

Obviously the planks will have swollen with immersion in the water or ammonia solution but temporarily fixing in place produced the desired shape. After 24 hours for the timber to dry (and using a hair drier as well), there were significant gaps between the planks (Fig. 20) but when they were removed from the frames and finally glued back in place, this proved to be of little consequence.

Figure 20: Temporary Fixing of Wet Planks

The planking required sanding and the use of a filler to produce a uniform finished surface. Figure 21 shows two significant areas of filling at either end of the hull.

Figure 21: Use of Filler to Produce Uniform Surface

Gun Deck Gunports

Gun Deck Jig

A jig was constructed from scrap wood and used for the edge determination of each gun port for the Gun Deck. Fig. 22 shows the correct dimensions of the gun port. These dimensions allow for the battening that lines the gun port openings. The 55 mm. barrels were designed to fit at the mid-point of the openings (vertical red line in Fig. 22).

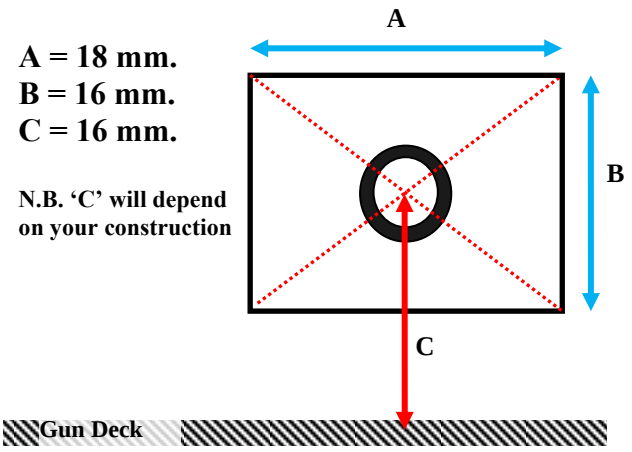
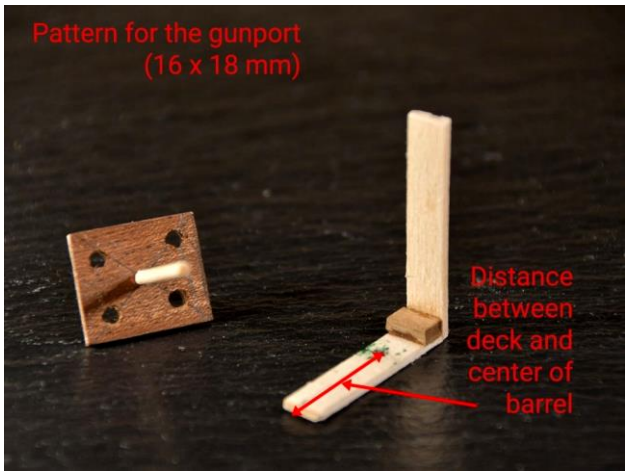
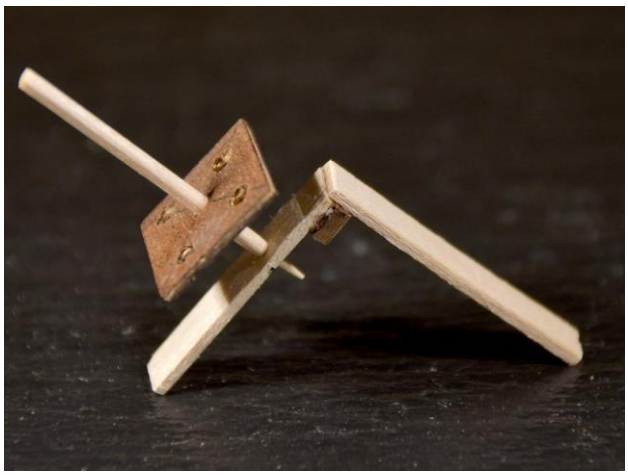
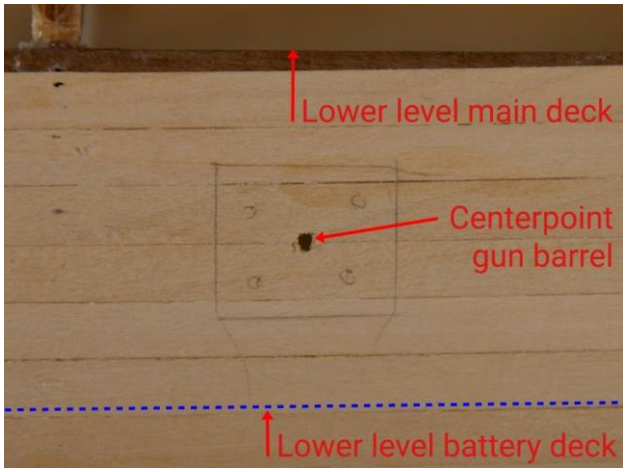


Figure 22: Gun Port Dimensioning for Gun Deck







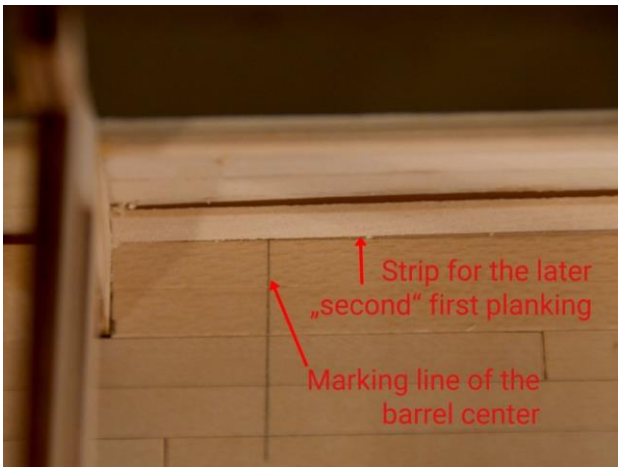


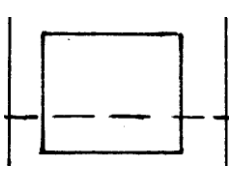
Figure 23: Creating a Gunport Opening

…. Fig. 23 photos reproduced courtesy of maggsl_01, member of MSW forum

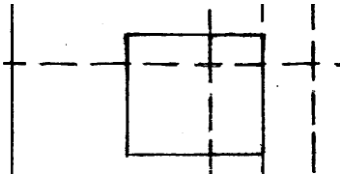
Gun Port Separation

There are TEN ports to be marked out and small inconsistencies will contribute to a significant change over the length of the hull. There is a difference in separation between the ten ports and careful reference should be made to Plan Sheet 10.

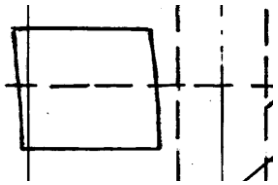
Three key markers *should be made for this setting out.* They are the positioning of …



… the **gun port between Frames 9 & 8**



… a **gun port between Frames 6 & 5** where the forward side of the opening is lined up with the centre-line of the Main Mast



... a **gun port between Frames 3 & 2**

Figure 24: Gun Port Position Markers

Double first-planking was continued upwards over the area where the gun ports would be marked out.

Cutting Out Gun Ports

To cut out the gun ports, holes were drilled through the hull near each of the four corners. Cutting from corner to corner diagonally as well as along each side was done with a mini circular saw attached to a Dremel (the cutting out can be achieved by a myriad of other approaches and not necessarily using a power tool).

Figure 25: Gunport Openings Finished

…. Fig. 25 photos reproduced courtesy of maggsl_01, member of MSW forum

The edges were trimmed back to just inside the pencil lines that marked the ***18 x 16 mm.*** opening. Final trimming is discussed in FW.03.

Chapter 3: STEM POST, FALSE KEEL & STERN POST

The first planking had now been finished (with the surface sanded and filled where necessary) up to the main deck level – actually approx. 10 mm. above side supporting stringers. The gun deck ports were cut but not finished to size. It was then time to look at the posts and false keel.

False Keel Rabbet Groove

The following will only apply if the 'keel + first planking' width combination finished up as approx. 8 mm.

A 'rabbet' groove was incidentally formed along the length of the false keel due to its greater width than the keel (10 mm. vs. 8 mm.) which allowed the second planking to fit neatly into that groove. Fig. 26 shows the necessary difference in thickness.

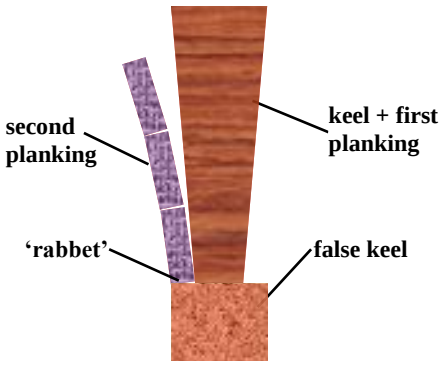


Figure 26: 'Rabbet' Groove for Second Planking

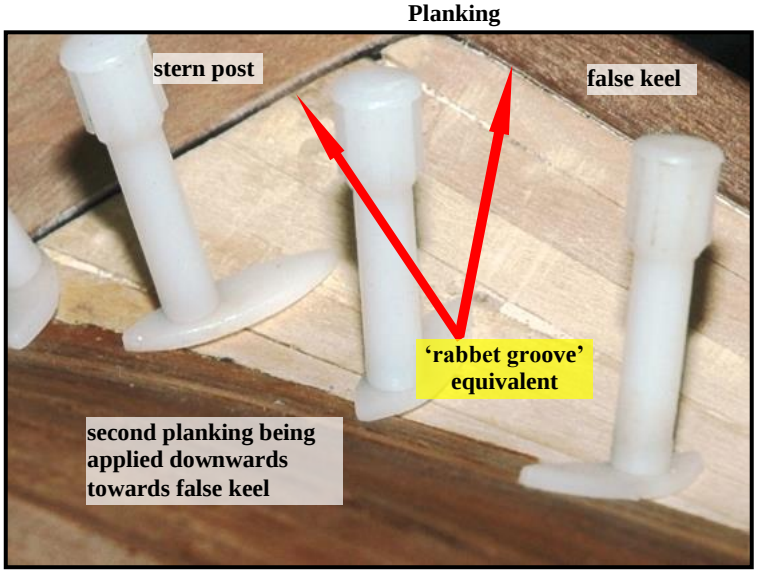


Figure 27: Ship Side View; Rabbet Groove Equivalent Exposed

Figure 28: Forming the Prow Deck

Prow Deck

Following the profile of Frame 2, the prow deck has a typical curvature across its width. It was decided to separate this deck section from the main deck halves (Fig. 28) and glue them in place. The opening for the bowsprit mast was then adjusted.

Removing the deck halves from the main deck pieces allowed the prow deck to be assembled in place and make any small adjustments to the slope of the bowsprit mast.

A small recess (shaded yellow) had to be cut out of the deck to allow the head to 'hook' into this space.

False Keel Preparation

The drawings in Plan Sheet 11 showed the profiles for each bulkhead (frame) but the fine tapering at each base was ignored. As Fig. 29 shows, the bulkhead tapering was extended down over the keel. The ***10 x 10 mm.*** false keel supplied was to be attached to the bottom of the keel at a later stage but before doing so, the keel needed to be tapered to a width of approx. ***6 mm.*** prior to first planking.

Figure 29: Tapering the Keel

Fig. 30 shows the dimensions of '***7 x 10 mm.***' for the false keel. There is the possibility of mis-interpretation about the correct size of the false keel but all was fine when it was realised that the lesser figures indicated the view from the bow towards the stern. The bow stem had been cut ***3 mm.*** into the false keel leaving a ***7 x 10 mm.*** section visible !

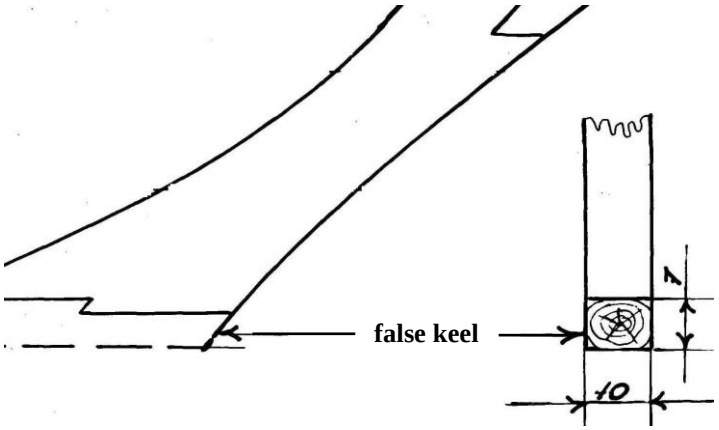


Figure 30: Bow View of False Keel Cross-Section

The false keel was ***10 mm.*** wide along its continuous length except the area underneath the bow stem where side tapering occured down to ***8 mm.*** [Plan Sheet 2 indicated a wider false keel but in this kit build, the ***10 mm.*** width is a slight modification that works well]

Beakhead

Background & General Interest

The beakhead is in fact an incredibly complex combination of timbers that form the forward projecting part of the ship. This can be vastly simplified or expanded in its detail. The following text is presented for the builder's interest but in no way is suggestive of any construction that should be carried out.

- ***stem/ stem post*** (red) – usually consisted of three pieces of timber; the lower section had a distinct curvature between the lower gun deck and the keel. The upper secion was near perpendicular.

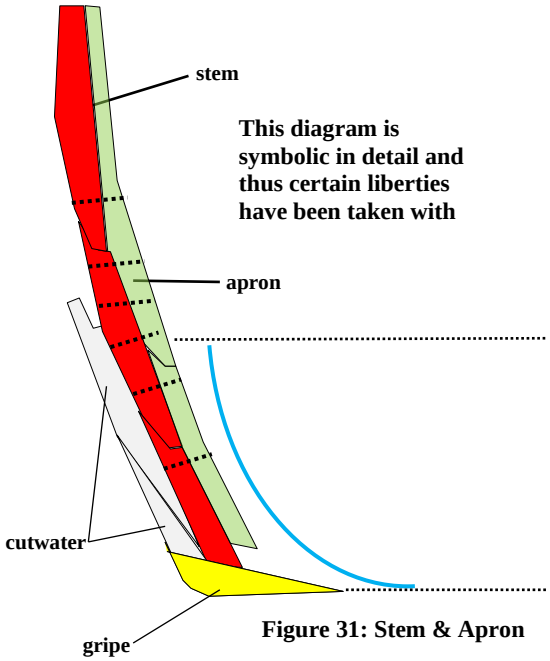


Figure 31: Stem & Apron

- ***false stem/ apron*** (green) – due to the inherent weakness of the stem pieces and the joint it forms with the keel, a false stem consisting of two pieces was placed aft of the actual stem in such a way that its joints were offset to the stem joints – the stem and the apron then being bolted together.

- ***cut-water pieces*** (gray) – the most forward part of the knee, formed of a collection of several pieces of timber, creating a wide upper part, where it projects forward from the stem to open the body of water as the ship sails through [Falconer: http://nla.gov.au/nla.cs-ss-refs-falc-0405]. Due to its being a number of timbers, the actual configuration in relation to the whole knee is distinctly variable. For this ship, there are many more pieces making up the wide extension

- ***forefoot/ gripe*** (yellow) - is connected by a scarf (type of internal mortise and tenon joint) to the extremity of the keel with the other end curved upwards and attached to the lower end of the stem [Falconer: http://nla.gov.au/nla.cs-ss-refs-falc-0559].

Beakhead Representation

The supplied 'stem post' is actually the total beakhead - **stem post** *and* **knee of the head**.

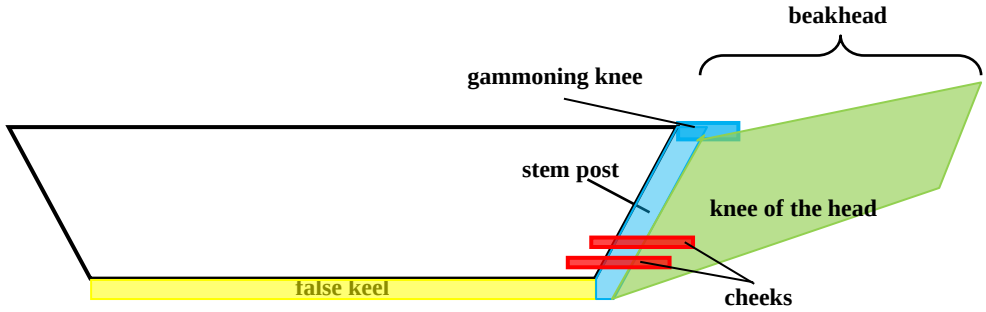


Figure 32: Bow Terminology

The '*knee of the head*' is a **continuation of the stem** (stem post) and is a large flat piece of timber supporting the ornamental figure placed underneath the bowsprit. Being extremely broad at the upper part, it is composed of many parts.

At the lower end, it is secured to the bow with horizontally mounted pieces shown in ***red*** - '*cheeks of the head*' that wrap over both the bow hull surface and the knee of the head itself.

The upper end is secured to the stem by the vertically mounted *standard*, being part of the gammoning knee – indicated in ***blue*** in Fig. 32 but realistically shown in Fig. 33.

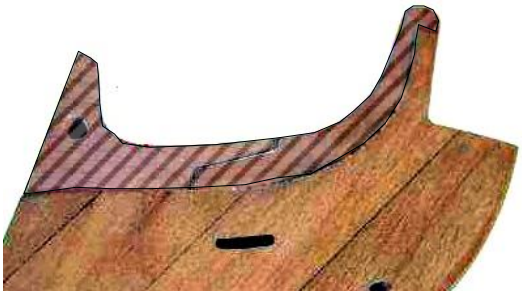


Figure 33: Standard (& Extension)

The kit supplies a blank piece for the knee of the head and from my own observations, that is how it is used. It seems a great shame to ignore the representation of individual timbers used in this knee and with a little effort, scribed lines could be created to good effect.

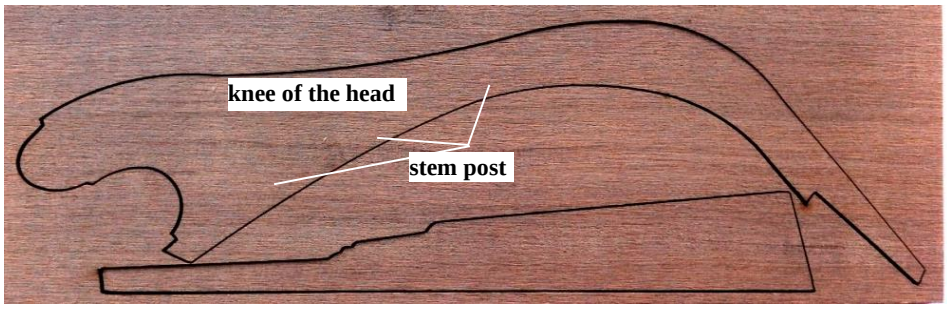


Figure 34: Laser-cut Sections

Having said that, it must be remembered there was a *great variation in how the timbers were put together* in different periods of ship building as well as between different shipyards. It follows that the pattern scribed onto a blank piece could be quite variable.

At this stage, the *bowsprit mast (FW.08) should be constructed* as it will serve to check on the dimensional relationships between the stem post, the bowsprit itself, the knee of the head and the lion figurehead.

'Stem Post' Preparation

The beakhead support tapers forward from 10 – 8 mm. but that was ignored – a more serious modeler would consider that.

A few lines (as shown in the drawings) were carved into the support surface to simulate the array of timbers present. However, as indicated in Fig. 31, the complexity is far greater.

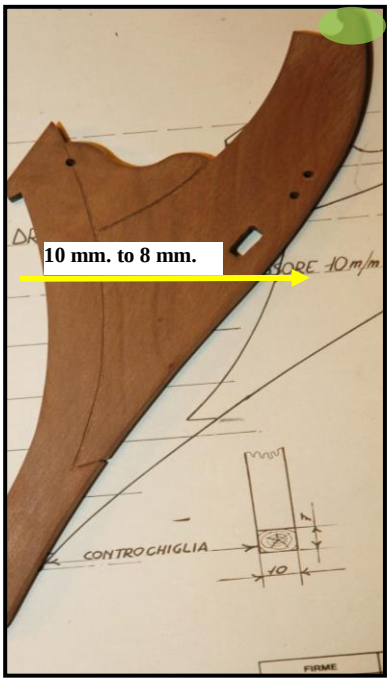


Figure 35: Possible Tapering of the Stem Post and Knee of the Head

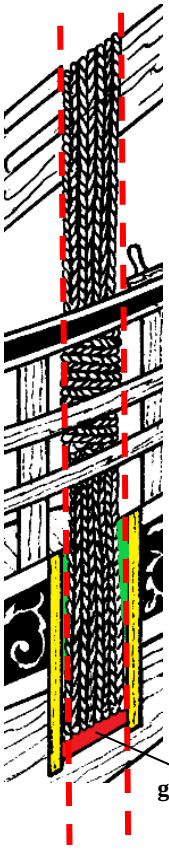


Figure 36: Gammoning Slit Position

Gammoning Slit

It also proved important to determine the position of the gammoning slit (shaded red) in the lower part of Fig. 36. To do this, the bowsprit was temporary inserted into place and a vertical estimation of the gammoning rope width was translated downwards.

The positioning of the single hole (for the main stay) follows that as shown in the drawings and is unaffected by either the bowsprit or figurehead positioning.

Figurehead Positioning

The lion figurehead has some significant dimensional differences when comparing the drawings against the metal casting provided.

Part of the juggling process involved:

- ***shortening the aft end of the bowsprit mast*** after it had been constructed as per the drawings
- ***lowering the forward part of the knee of the head*** as indicated in the yellow circle below.
- ***allowing enough space above and below the lion figurehead*** for the two cheeks.
- ***determination of the position for the two holes*** *below the figurehead*

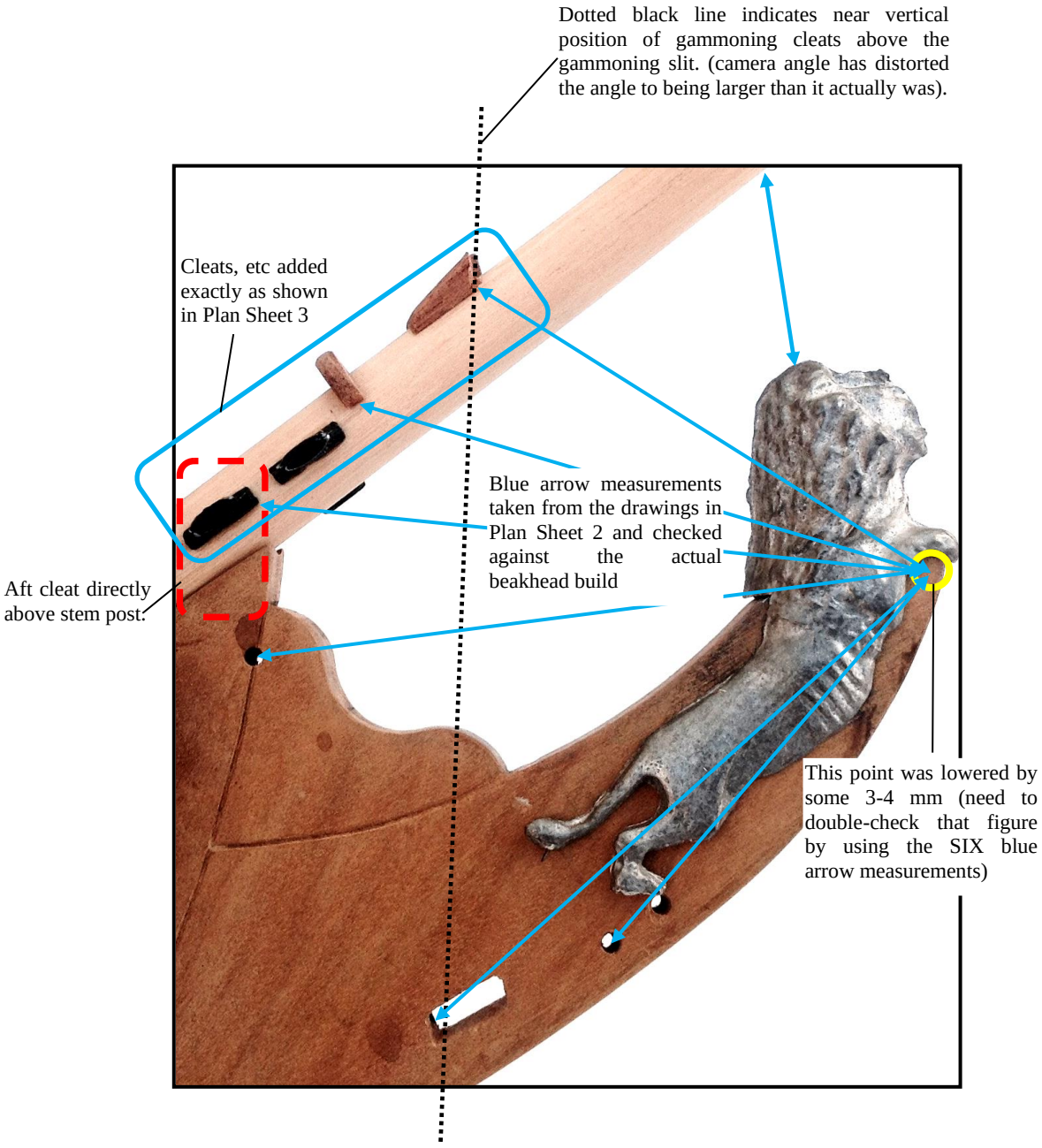


Figure 37:Cross-Checking Beakhead Positions

Figure 38: Gammoning in Different Position

Interestingly, Fig. 38 shows a simplistic approach where the gammoning rope channel is omitted and the gammoning slit is located just under the upper edge of the knee of the head (red arrow). Proof that there are unlimited choices to be made – even if they are incorrect.

More detail on this gammoning channel and the rail construction is provided in FW.06

'Stem Post' Installation

The ideal approach in ship building is to form a rabbet along each side of the stem post to allow for the insertion of the planking (in this case the second planking). This was avoided and each plank was butted against the post. Not ideal – but this is a kit build. Some may choose to form the rabbet.

Here was a quandary ...

- The 'stem post' had to be dry-fitted and checked against the false keel
- The 'stem post' also had to be dry-fitted against the bowsprit

These two combinations presented some difficulty and so after checking the second point (post-bowsprit) for a reasonable fit, the first point (post-keel) became the focal point. Afterwards, the second combination would be adjusted.

Figure 39: Supporting Nails for the Stem Post

The post internal edge needed some modification for a tight fit and this depended on how the first planking was applied and sanded back.

Some significant changes had to be made to the depth of the structure supporting the Bowsprit Mast below the Prow Deck. This was caused by having to lower the stem post sufficiently to match with the false keel.

Figure 40:Stem Post Fitted

Satisfied finally with the fit against the bow planking, two horizontal holes were drilled into the post and two nails (approx. 2.8 mm. diameter) were fixed with instant glue (Fig. 40).

This assembly was then glued into the keel.

False Keel & Stern Post Installation

Before proceeding with the remaining first planking, both the false keel and stern post were fixed in position.

Apart from using glue …

- four thin nails passed through the false keel into the keel, &
- one large nail was also used passing from inside the stern post and into the keel

The length of the false keel was shortened and beveled as shown.

Figure 41: Stem and Stern Posts; False Keel

Figure 42: Stern Post

…. Figs. 41 and 42 photos reproduced courtesy of maggsl_01, member of MSW forum

Chapter 4: FIRST PLANKING *ABOVE* MAIN DECK

Ensign Staff Preparation

This mast technically passes *through* the Poop Deck and if that is to be the case, then some preparatory work is required before installing the poop deck. However, most builders simply install the mast onto the deck surface.

Figure 43: Ensign Staff on Poop Deck

Alternative 1: Mast on Poop Deck.

The mast can be constructed at this stage but obviously not installed.

- Plan Sheets 1 & 2 show most of the detail required.
- The staff would be set at 102º to the poop deck but the final angle is dependent on the individual build.
- The kit allows for a length of ***8 mm.*** rod to 'vertically' support the staff pole (E1). Fig. 43 shows this support as square in cross-section and would be made from scrap timber.
- Dimensions:
  - **curved supporting knee beneath the staff**
    24 mm.by approx. 18 mm. high.
  - **staff pole**
    144 mm.; tapering upwards from ***4 to 3 mm***.
  - **staff support**
    6 x 6 x approx. ***36 mm.***
  - **separation between tenon and open hole** in mast cap - approx. ***5.5 mm.***
  - **mast cap [E2]**
    same dimensions as that for mast cap [B6]

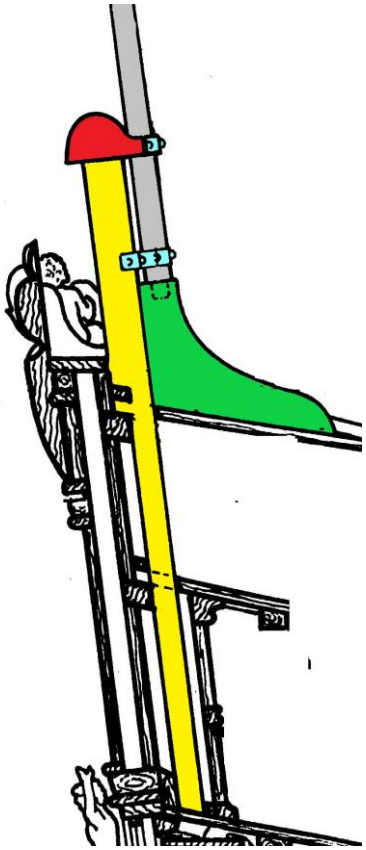


Figure 44: Ensign Staff Supported Below Poop Deck

Alternative 2: Mast through Poop Deck

The alternative method follows the drawing in Plan Sheet 2 and obviously secures this mast more securely – and gives a better grasp of the historical construction!

Bulwark Planking

Alternative 1: Single First Planking

Very basic … one thickness of first planking following the curvature guide of the projecting upper arms of Frames 4 & 5. Second planking is applied to both the outer surface and the inner surface between the upper 'arms' – although the upper arms could be removed. The following alternative method was used due to having the increased thickness of the first planking.

Alternative 2: Double First Planking

Historically, the bulwark construction would have had a supporting frame internally with an inner and outer wall. If the projecting frame arms were retained in order to achieve this, the overall thickness would be too large. Another problem was that just one layer of first planking was lacking in structural strength as well as just looking too thin. When the first planking was finished, the arms were removed and an extra thickness of first planking applied. As mentioned before, this approach does use a considerable amount of extra planking!

Either approach can produce a significant problem – the distance between Frames 4 - 5 – 6 is large and without due care, allows for unwanted warping along the length. To guard against this, I used a LARGE number of clamps overlapping the newly formed joint between the new plank and the installed plank beneath it.

Plan Sheet 10 becomes the focal point, portion of which is replicated below.

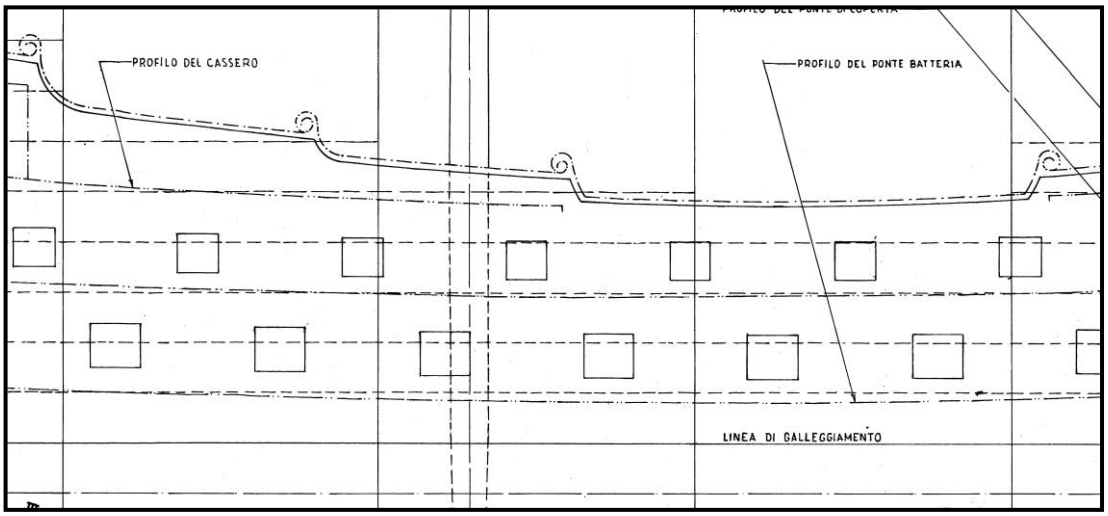


Figure 45: Plan Sheet 10 - Focal Point for Upper Planking

Whichever alternative to planking is followed, it was found that determination of the bottom edge of the gun ports along the main deck was best done when only two planks were in place above this deck.

Prow Deck Bulwark

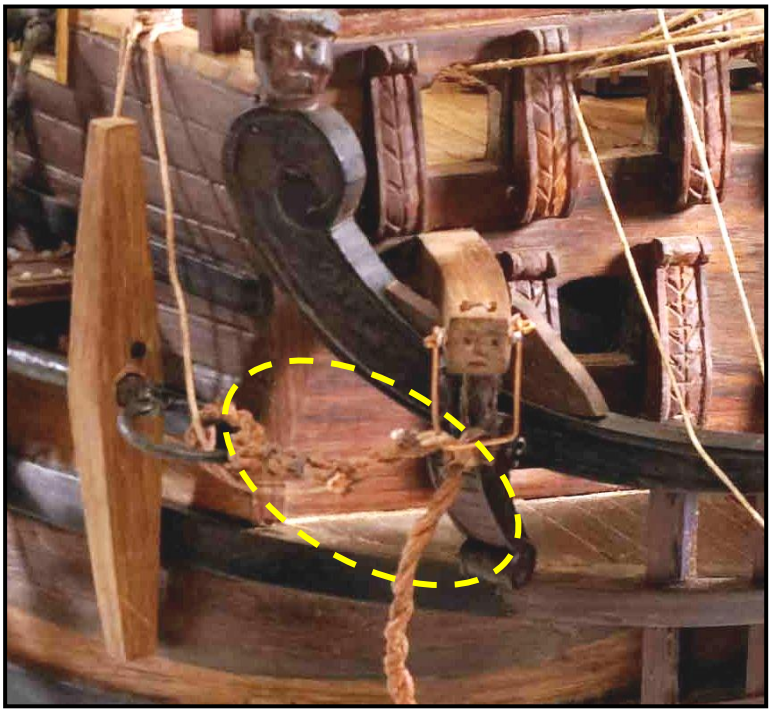


Figure 46: Absence of Curved Prow Deck Bulwark

With poor judgement, it was decided not to extend the first planking past Frame 1 at this stage. Examination of the drawings clearly shows a ***curved bulwark extend around the Prow Deck*** (Fig. 47 below) and this is discussed further in Section 3 of this write-up.

Fig. 46 shows what many builders have done – either ignoring or missing this extended bulwark detail. This is yet another illustration of how ship construction can vary from builder to builder.

NOTE:

- curved bulwark supports the top rail from underneath.
- top rail (not supplied as a metal piece) must be carved by the builder and its construction was left until a later stage.
- cathead is supported by a bracket seated on the upper surface of the top rail

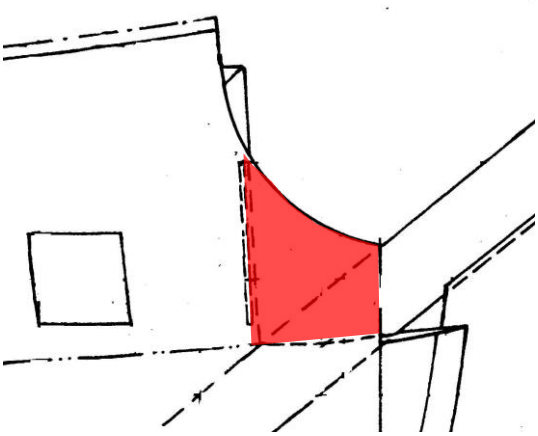


Figure 47: Extended Portion of Bulwark at Bow

Main Deck Gunports

How the carriages and cannons were put together has a major influence on how the gun port positioning is determined. Whether the carriages were modified to more closely resemble the drawings becomes an important issue. In the end, it is *essential that the carriages and cannons are assembled* before making any cut outs in the hull.

There was a disparity between the position of the top edge of the main deck gun port shown in Plan Sheet 2 and when utilising the actual cannon mounted on its carriage [the angle at which the photograph of the actual cannon was taken is a little misleading].

In Fig. 48, the drawing would suggest that the top edge was only ***17 mm.*** above the deck but this simply did not fit and so the top edge became approx. ***21-22 mm.*** above the deck. This depends on both the carriage construction and the interpretation of the gun port opening dimensions. The latter varied between ***14 to almost 15 mm.***

Calculations suggested that the gunport bottom edge *should be approx. 7.5 mm. above the deck.*

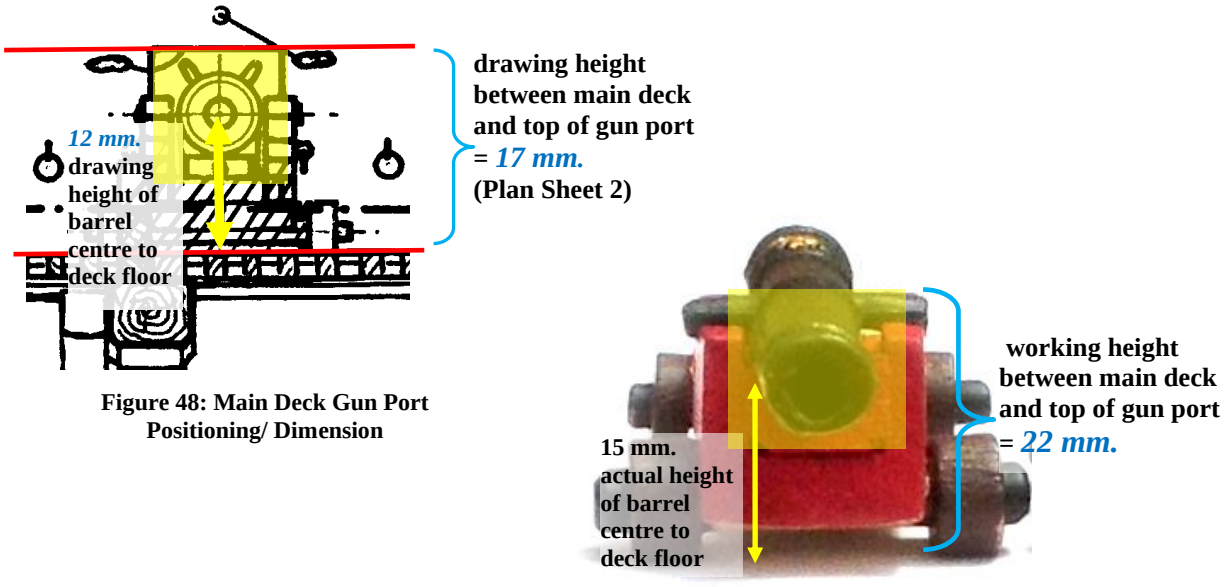


Figure 48: Main Deck Gun Port Positioning/ Dimension

The deck was only temporarily put in place so that the positioning of gun ports could be carried out with another jig; alternatively, the top edge of the stringer can be taken as a reference point. However, when using a jig, great care must be taken with the fact that it will be seated on a deck camber and that in itself becomes important in designing the jig shape.

Batten lining followed the same technique as for those in the gun deck gun ports.

Fig. 49 shows the correct dimensions of the gun port – especially the width. These dimensions allow for the battening that lines the gunport openings.

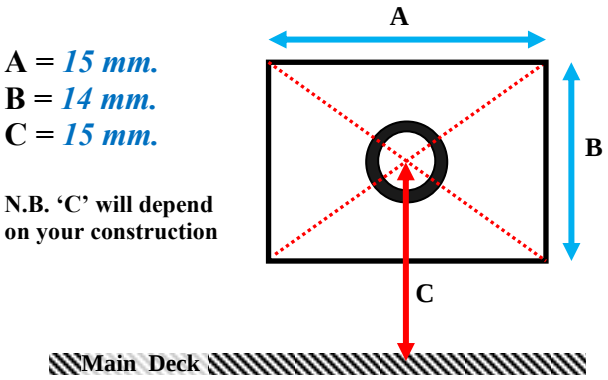


Figure 49: Gun Port Dimensioning for Main Deck

Unlike the gun deck, which was fixed in position before cutting out the gun ports, this deck was not in position so the ***vertical measurements*** were taken from the top edge of the stringer that would be supporting the Main Deck. This measurement included the thickness of the deck.

- thickness of planked deck = ***2.4 mm.*** (not yet in place)
- height 'C' = ***15 mm.***
- one-half height 'B' = ***7 mm.***

Thus the overall height of the gunport top edge *in this build* was approx. ***24.4 mm.***

Frame Breakages

A problem experienced was with the very fragile upper ‘arms’ on the forward frames used for forming the shape of the upper bulwarks. This applied to Frames 2 through to 6. A number of these broke off during the construction and it proved difficult to just glue them back in position and still retain their original ‘strength’. The following photos illustrate a solution to temporarily maintaining the broken arms in their original positions.

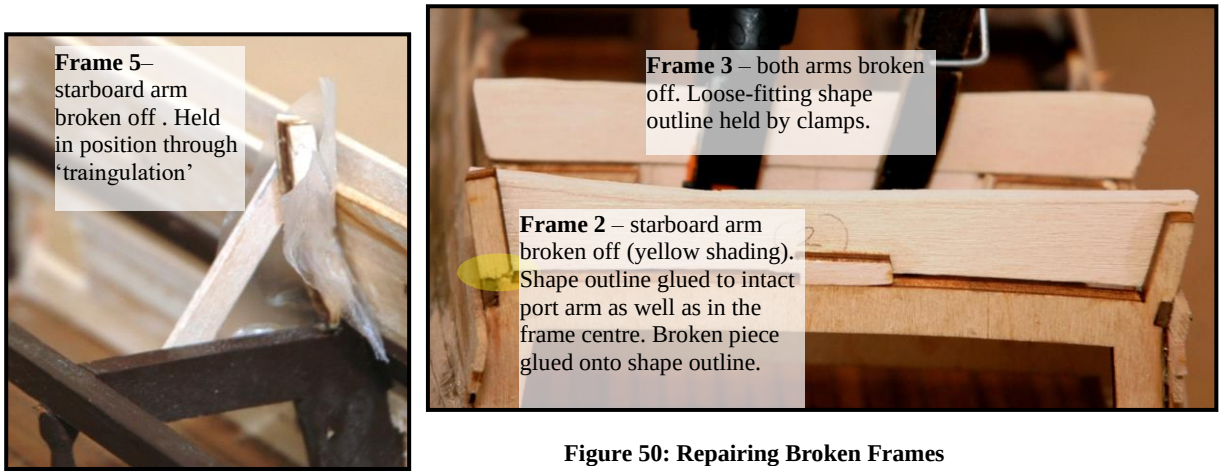


Figure 50: Repairing Broken Frames

Bulwark Height Measurement

Builders often comment on the need for the bulwarks to be higher above the deck than is shown in the drawings. Part of Plan Sheet 2 is shown below that explains the problem and provides the correction necessary.

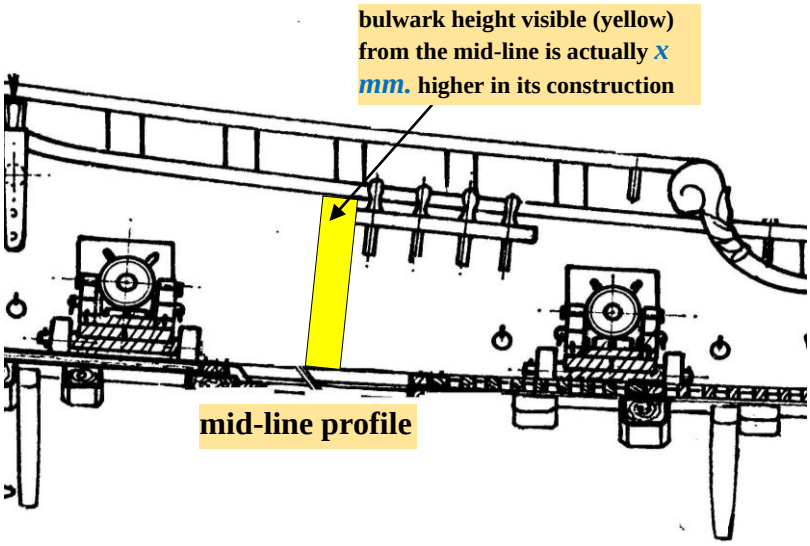


Figure 51: Bulwark Height Above Deck Appears Incorrect

Deck camber causes portion of the bulwark wall to be not visible when viewed from the mid-line profile. In the drawing showing the wall, it *appears to be shorter* than it actually is.

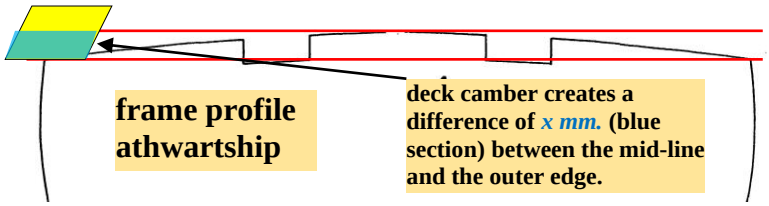


Figure 52: Bulwark Height Correction

Second Layer of First Planking

As this is a second alternative to the planking, the following will not be applicable to all builds.

Figure 53 shows the first plank in place separated from the main deck supporting stringer by four small blocks (yellow circle) to allow the deck to slot into the correct position. Although clamps on the plank were used, it was also useful to hold the strip with a small nail pushed through the double layer (red circle).

- Very much in evidence on the port side are the rough cut out gun ports that were to be finished off to the correct dimensions later.
- Not so evident is the second layer already completed above the gun deck.
- Both the inner and outer hull surfaces still need to be cleaned up and smoothed back in preparation for the second planking.
- The upper ‘arms’ of Frames 4 & 5 have been removed due to the extra strength of the double first planking (plus the fact they were an internal part of the bulwark walls and thus not visible).

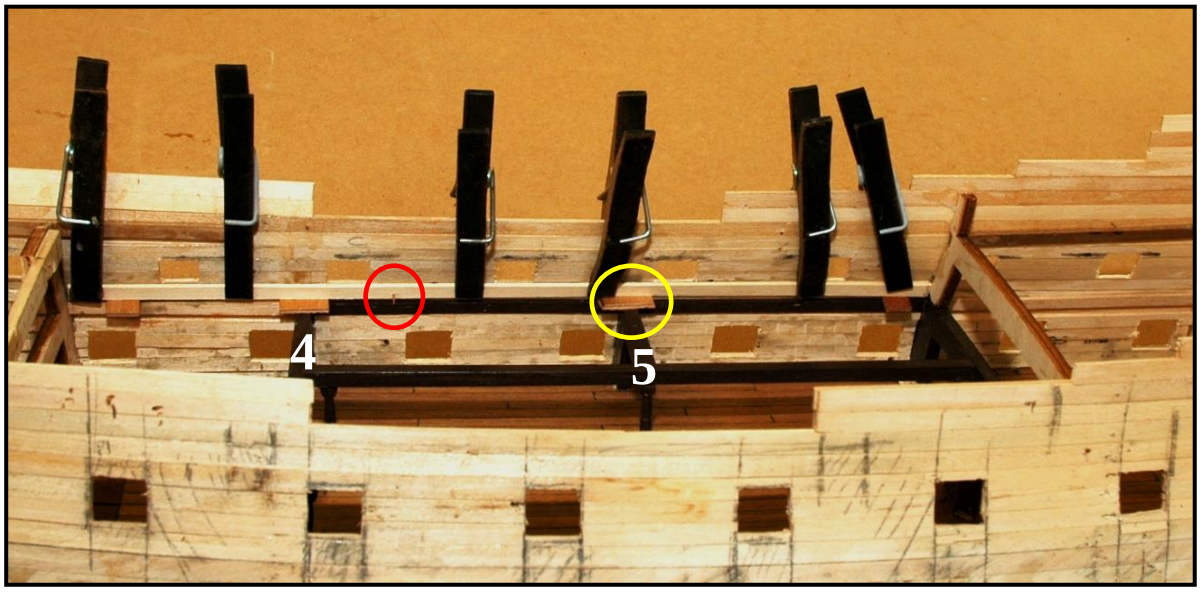


Figure 53: Starting the Second Layer of First Planking Above Main Deck

Aft Frames 6 – 10

The frame upper ‘arms’ need some careful consideration and the following points show what was done. Others may disagree and follow their own construct.

To simplify matters, some builders will opt to leave the upper ‘arms’ in place.

- The *yellow broken line in Figure 54 below represents the upper quarter deck*. The forward edge of this deck is between Frames 7 & 8 so there will be a need to remove some of the supporting stringer on each side. This front edge will require some supporting and this will be looked at later.

- Frame 7 requires partial removal of the upper section as shown in the figure by blue shading.

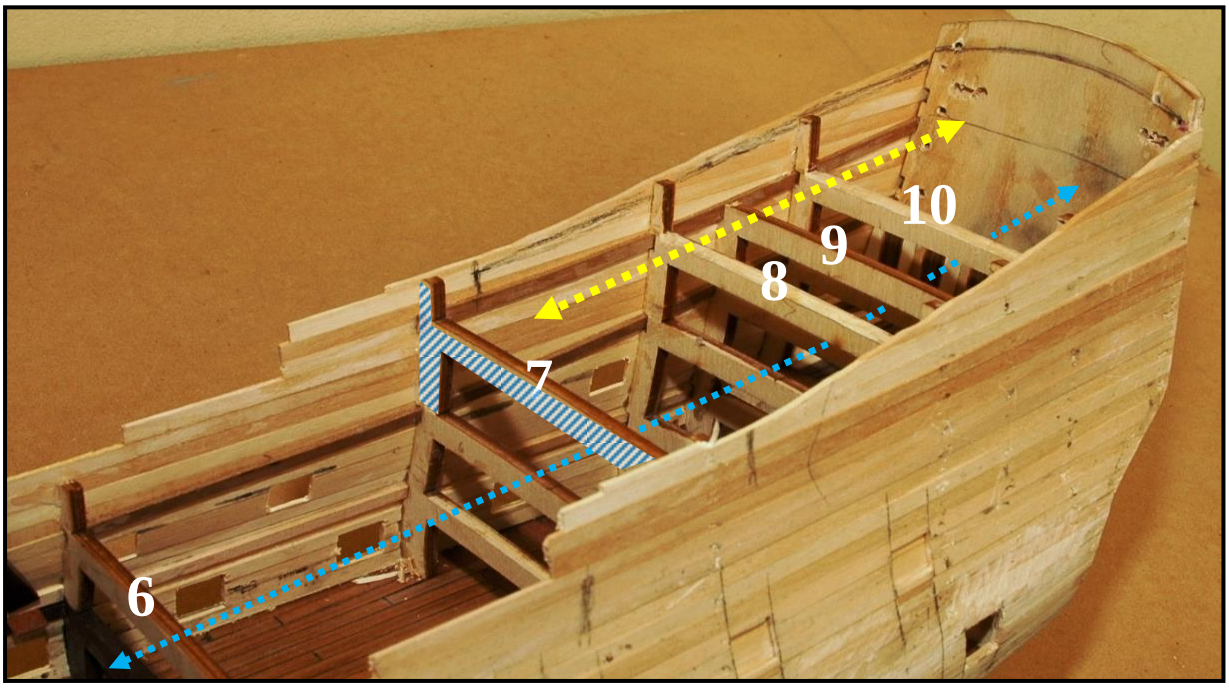


Figure 54: Ammending the Aft Frames

- The upper ‘arm’ for Frame 9 was accidentally broken off but not an issue.

- The upper ‘arms’ for Frames 8 & 9, although too high (by just a few millimeters) were to be removed prior to double first planking these bulwarks (Fig. 54).

- Frame 10 upper ‘arm’ needed to be shortened by a few millimeters but left in position since it will support the Poop Deck bulkhead.

- The ***blue broken line in Figure 54 above represents the quarter deck***. The forward edge of this deck is between Frames 6 & 5 so there will be a need to add some supporting strips on each side (Fig. 53). This front edge will require some supporting and this will be looked at later.

Figure 55: Removal of Frame Segments

Figure 56: Supporting Beam Required Under Upper Quarter Deck