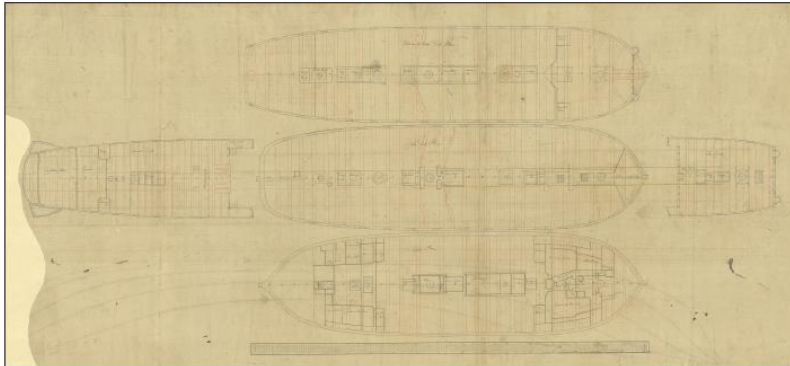


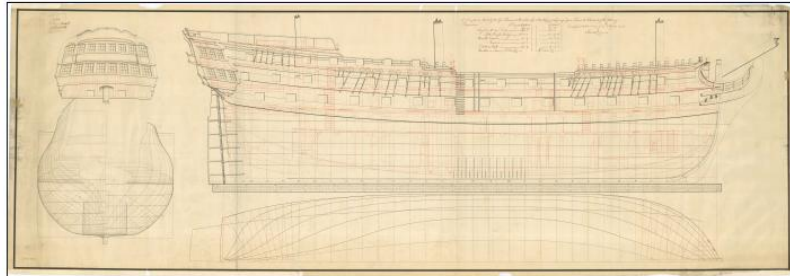
READING SHIP LINES PLANS (Lines Drawings)

Alan O'Neill

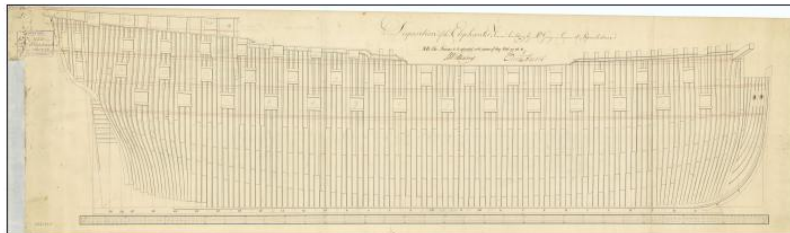
Marine Modellers of Niagara (Nov 2017 meeting)



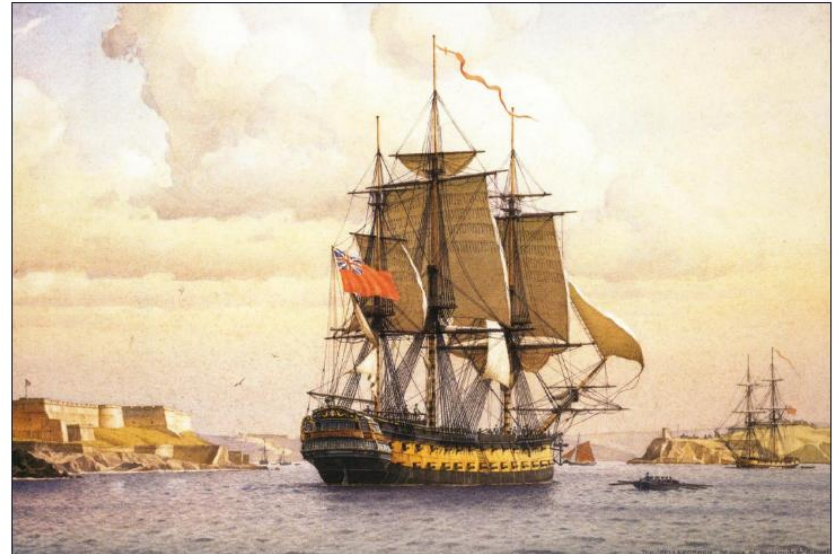
Deck Plan



Sheer , Body and Half Breadth Plans



Framing Plan



ARROGANT CLASS

Man of War - Ship of the Line

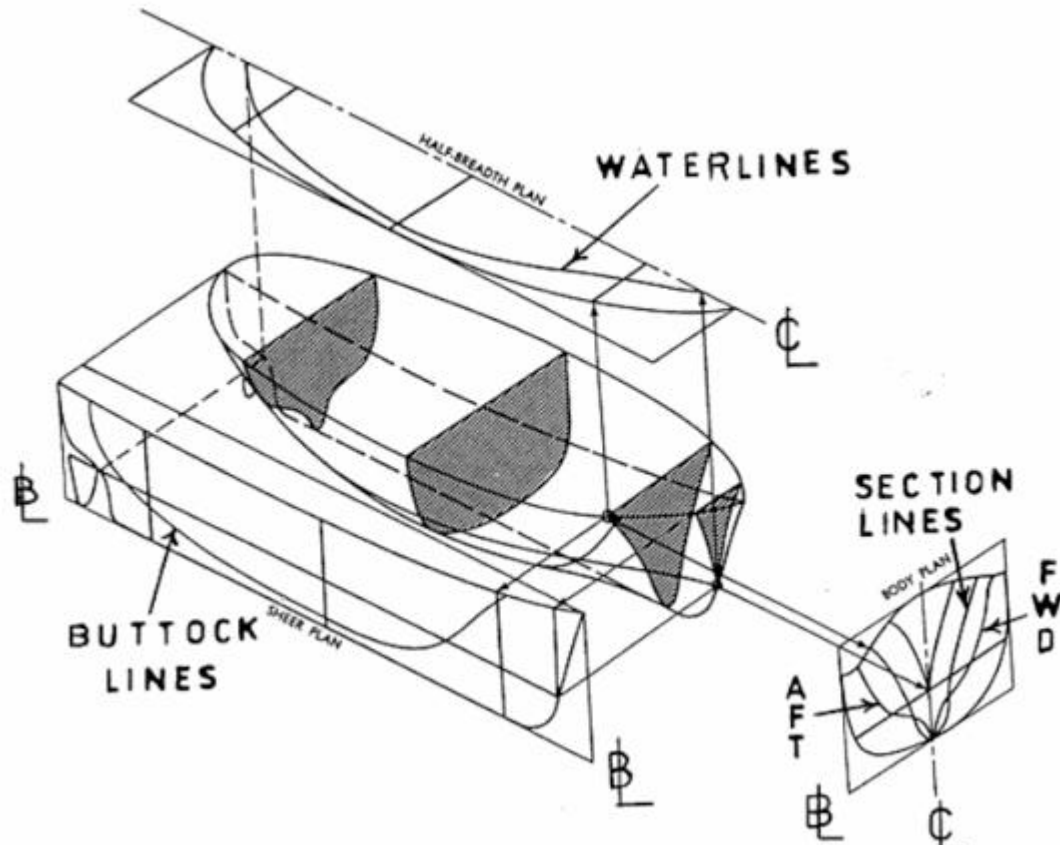
3rd Rate - 74 guns

HMS Arrogant. 1761 - 1810	HMS Goliath. 1781 - 1815	HMS Elephant. 1786 - 1830	HMS Vanguard. 1787 - 1821
♦	♦	♦	♦
HMS Cornwall. 1761 - 1780	HMS Zealous. 1785 - 1816	HMS Bellerophon. 1786 - 1824 <i>Prison hulk</i>	HMS Excellent. 1787 - 1835
♦	♦	♦	♦
HMS Edgar. 1779 - 1814 <i>Prison hulk</i> 1813 - 1835 <i>renamed Retribution</i> 1814 - 1835	HMS Audacious. 1785 - 1815	<i>renamed Captivity</i> 1824 - 1836	HMS Illustrious. 1789 - 1795
		♦	
		HMS Saturn. 1786 - 1868	

Lines Plan

General

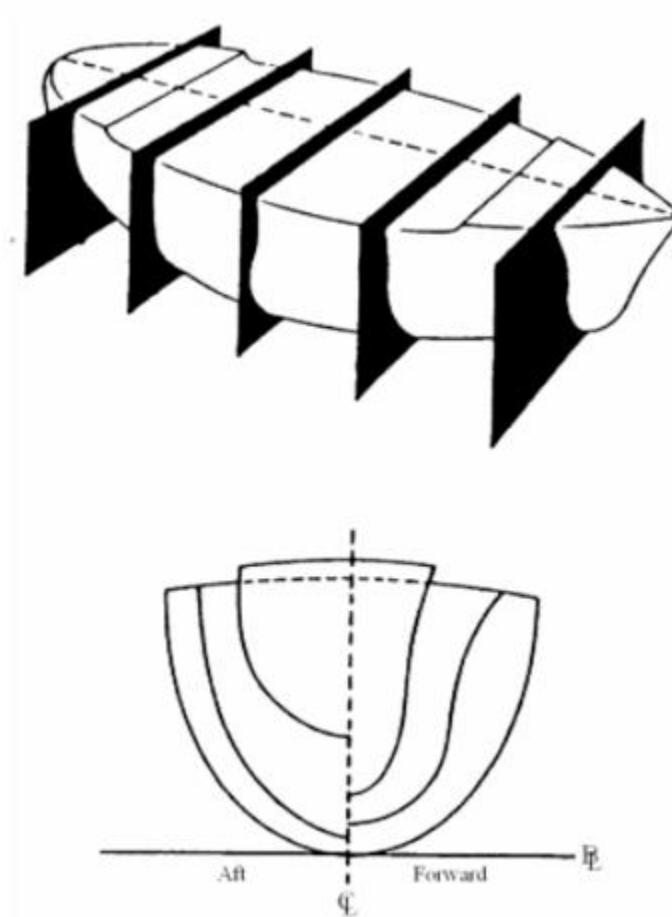
The lines plan (lines drawing) consist of projections of the intersection of the hull with a series of planes. The planes are equally spaced in each of the three dimensions. These set of planes are mutually perpendicular or orthogonal in nature.



Description

The point of intersection of these planes with the hull results in a series of lines that are projected onto a single plane located on the front, top, or side of the ship. This results in three separate projections, or views, called the Body Plan, the Half-Breadth Plan, and the Sheer Plan.

To visualize, place the ship in an imaginary rectangular box whose sides touch the keel and sides of the ship. The bottom, side and front of the box will serve as the basis for three orthogonal projection screens on which lines will be projected onto. The lines to be projected result from the intersection of the hull with planes that are parallel to each of the three orthogonal planes mentioned.

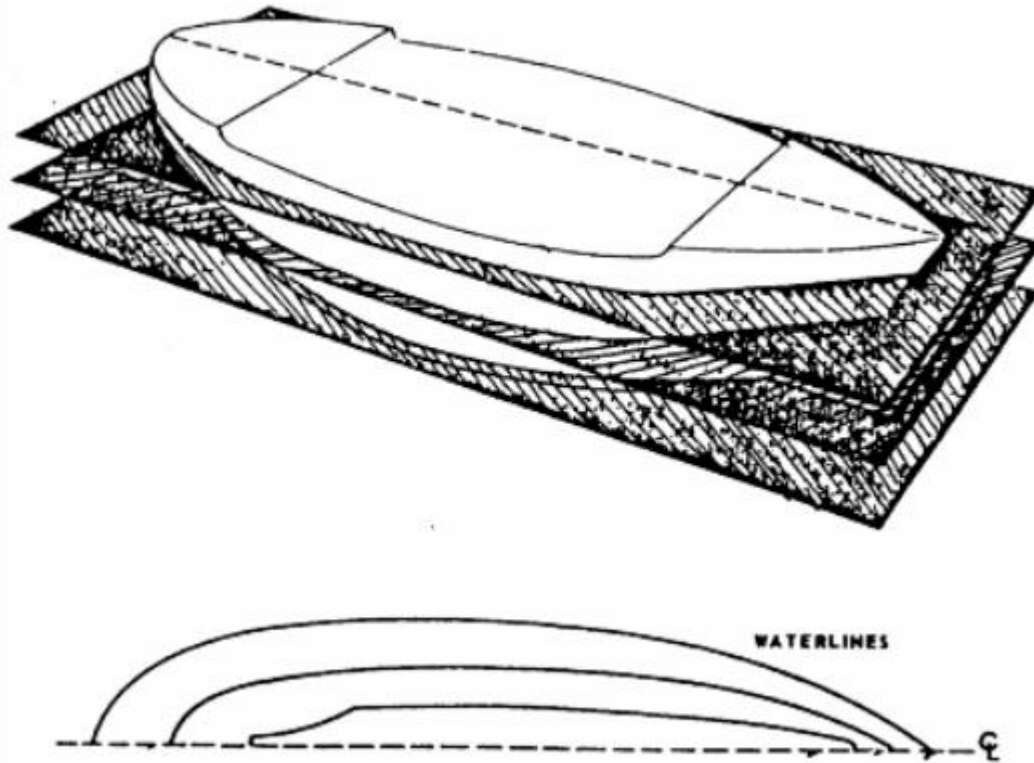


Body Plan

Planes parallel to the front and back of the imaginary box are called **stations**. There are three important stations. The intersection of the stem of the ship at the design water line is called Forward Perpendicular (FP). The intersection of the stern at design waterline (immersed transom) or the rudder stock is called the Aft Perpendicular (AP). The station midway between the perpendiculars is called the midships stations.

Each station plane will intersect the ship's hull and form a curved line at the points of intersection. These lines are called **sectional lines** and are all projected onto a single plane called the **Body Plan**.

The body plan takes advantage of the ship's symmetry. Hence only half the section is shown; the sections forward of amidships are drawn on the right side, and the sections aft of the amidships are drawn on the left side. The amidships section is generally shown on both sides of the body plan. The vertical line in the center separating the left and right half of the ship is called the **centerline**.



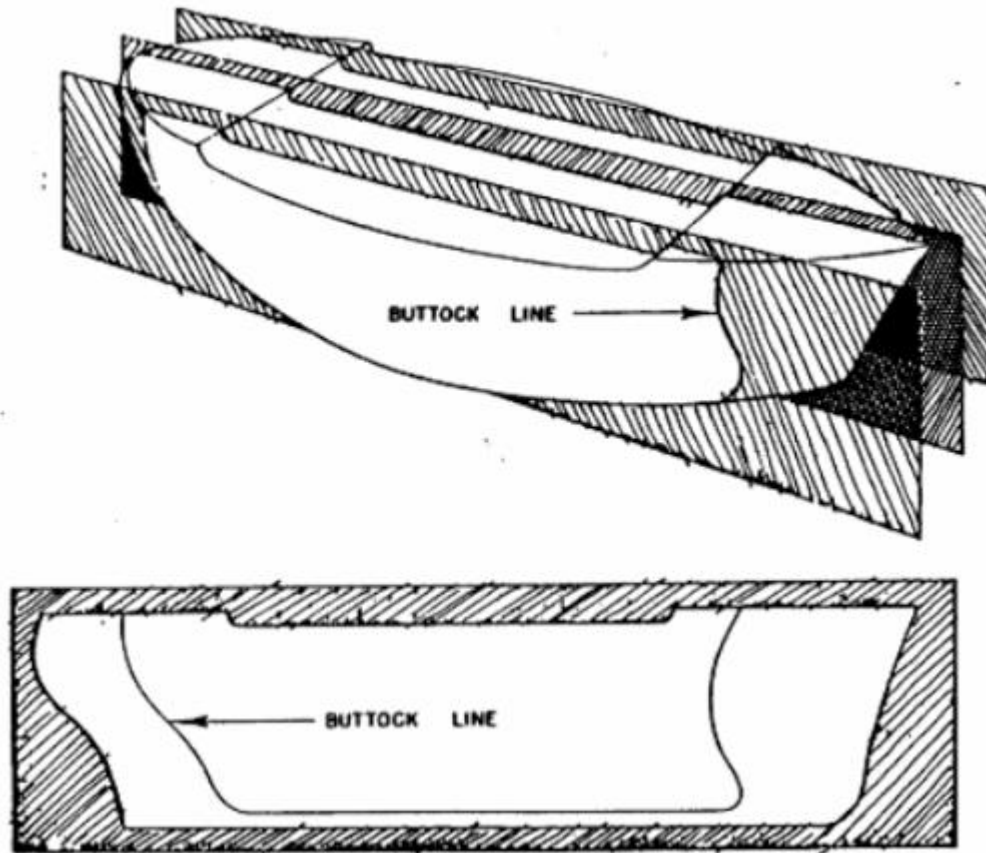
Half-Breadth Plan

The bottom of the box is a reference plane called the base plane. The base plane is usually level with the keel. A series of planes parallel and above the base plane are imagined at regular intervals, usually at every meter. Each plane will intersect the ship's hull and form a line at the points of intersection. These lines are called **waterlines** and are all projected onto a single plane called the **Half-Breadth Plan**.

Each waterlines shows the true shape of the hull from the top view for some elevation above the base plane.

The water lines referred to here has nothing to do with where the ship actually floats. There waterlines are the intersection of the ship's hull with some imaginary plane above the base plane.

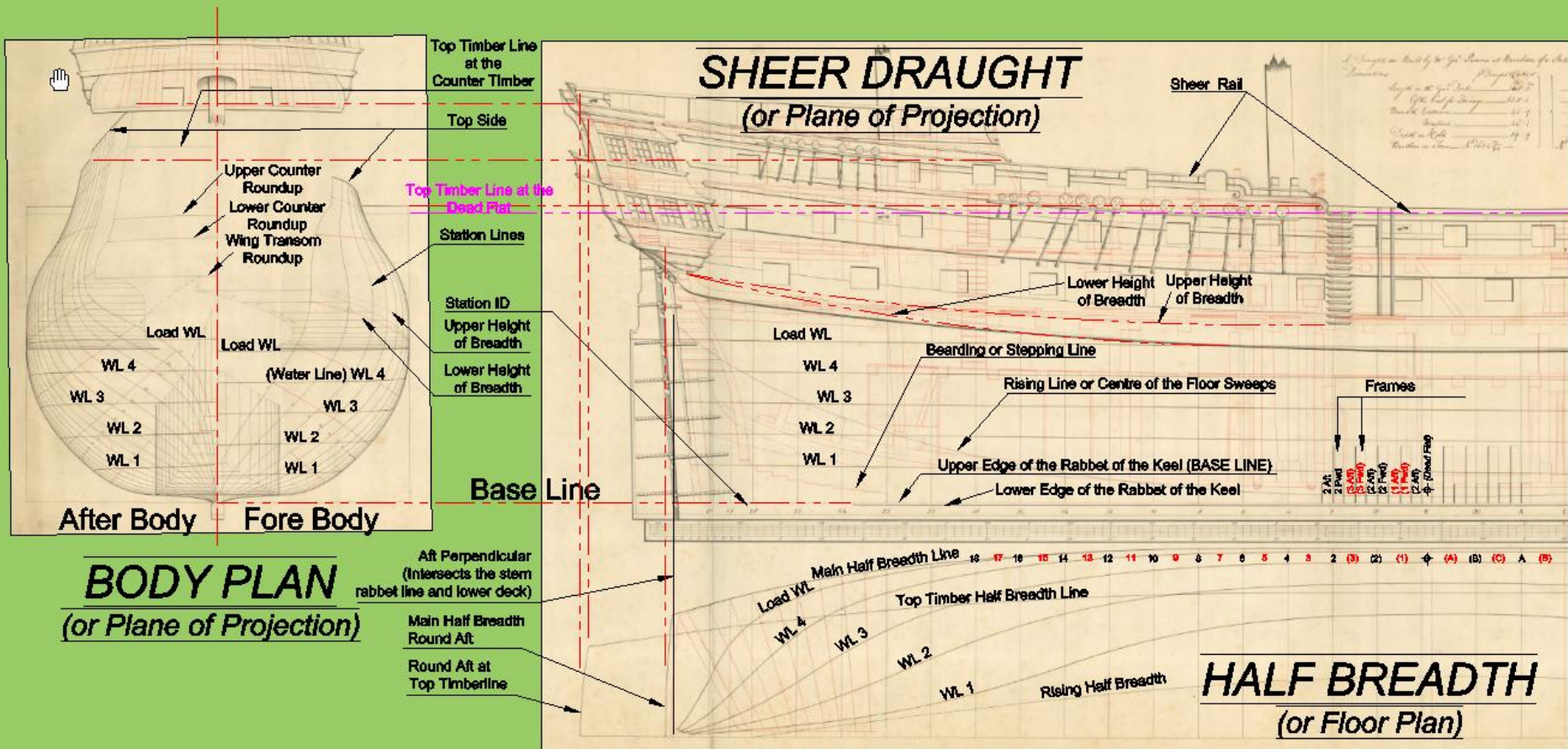
Since ships are symmetric about their centerline they only need be drawn for the starboard or port side, thus the name **Half-Breadth Plan**.

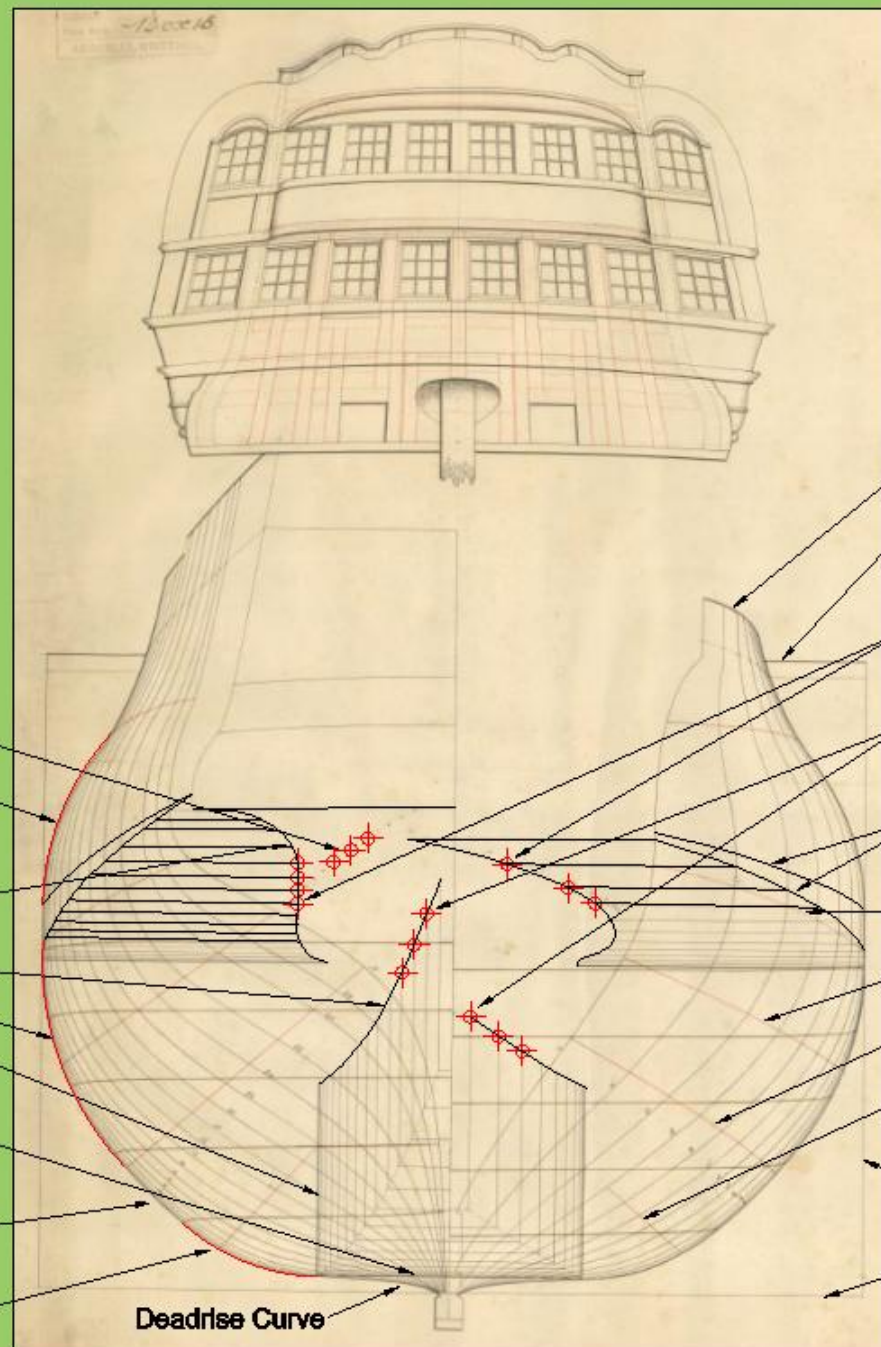


Sheer Plan

A plane that runs from bow to stern directly through the center of the ship and parallel to the sides of the imaginary box is called the centerline plane. A series of planes parallel to one side of the centerline plane are imagined at regular intervals from the centerline. Each plane will intersect the ship's hull and form a curved line at the points of intersection. These lines are called **buttock** or **butt lines** and are projected onto a single plane called the **Sheer Plan**.

Each buttock line shows the true shape of the hull from the side view for some distance from the centerline of the ship. The centerline plane shows a special butt line called the **profile** of the ship.





Centre of Upper Breadth Sweeps

Upper Breadth Sweep

Boundary of Lower Breadth Sweeps

Boundary and Centre of Floor Sweeps

Lower Breadth Sweep

Rising Height at Dead Flat

Dead Rise at the Dead Flat

Reconciling Sweep

Floor Sweep

Deadrise Curve

Topside

Toptimber Line

These points are used as the centres for drawing the lower breadth sweep arcs

These points are used as the centres for drawing the lower floor sweep arcs

Upper and Lower Height of Breadth
(Frame is flat between these)

3rd Futtock Head

2nd Futtock Head

1st Futtock Head

Floor Head

Side Line
(The moulded breadth or
widest point of the body)

Base Line
(The upper rabbet line in the keel)

Aft Perpendicular (AP)	aft end of the ships length coinciding with the intersect of the LWL and rabbet of the stern post
After Body	the part of a ship abaft midships
Base Line (BL)	a line used as a basis to locate or calculate from
Bearding or Stepping Line	Bearding is the beveling of any piece of timber or plank to any required angle. Bearding Line is the outer edge of the bearding, aka Stepping line as it may create a step onto which timbers are set.
Body Plan	an end elevation showing the contour of the sides of a ship at specific stations in her length
Breadth (B)	the maximum measured width of the ship's outer hull
Buttocks	A series of planes or imaginary cuts from stem to stern displayed as lines showing the hull contour on the Sheer Plan
Centre of Upper Breadth Sweeps	Centre of the arc forming the sweep below the lower height of breadth and above the lower breadth sweep.
Cutting Down Line	an elliptical curve line, forming the upper side of the floor timber at the middle line of the ship
Dead Flat	The midship bend or frame which has the greatest breadth. Timbers fore are marked A, B, C; those aft are marked 1, 2, 3; those adjacent the dead flat that have no rising are marked (A) (B) or (1) (2).
Depth (D)	The measured height from the Base Line to the Upper Deck
Draught (T)	The depth of the ship's keel below the waterline. Trim - the difference between the draught at the fore perpendicular versus the aft perpendicular
Floor Sweeps	Radial that sweeps the heads of the floor
Fore Body	the part of a ship forward of the largest or midship cross section
Fore Perpendicular (FP)	forward end of the ships length coinciding with the intersect of the LWL and rabbet of the stern post
Frames	The bends of timber that form the body of the ship composed of a floor timber, several futtocks and a top timber.
Half Breadth (or Floor Plan)	a half top or bottom view of the ship showing by horizontal longitudinal sections the forms of the various waterlines, rail and deck lines at the side, the frame stations, and the buttock lines
Head	as in the upper end of a futtock
Heel	as in the lower end of a futtock
Height of Breadth	main breadth or broadest part of the ship defined by two curved lines called the upper and lower height of breadth
Load Water Line (LWL)	LWL - the normal draught aka Design Water Line or Loaded Water Line which is the actual water line the ship floats at
Lower Counter Rail	Counter is a part of the stern. Lower counter is the arched part of the stern immediately above the wing transom; Counter Rail is the ornamental rails athwart the stern into which the counters finish.
Lower Edge of the Rabbet of the Keel	Rabbet or Rebate: a joint made by a groove or channel for the purpose of securing the edge of the plank; Lower edge of the Rabbet is flush with the lower or outer corner of the plank.
Main Half Breadth Line	a horizontal section at the height of breadth, showing the broadest part of the ship from the middle lines to the outside of every timber
Middle Line	A line dividing the ship exactly in the middle (<i>Half Breadth or width... centering</i>)
Rising Half Breadth	Rising line in the half breadth plan
Rising Line or Centre of the Floor Sweep	Rising: A term from the shape of a ship's bottom in general, which gradually narrows, or becomes sharper towards the stern and stern post... the floor... is raised or lifted above the keel. Rising Line: an elliptical line to determine the sweep of the floor heads throughout the ship's length
Round	The segment of a circle
Scantling	The dimension given for the timbers, plank, etc. All quartering under quartering under 5 inches square. All measuring above that size are called caulking.
Sheer Draught	a drawing of the profile or side elevation of the ship's form
Station ID	the identification number or letter assigned to the station line
Station Lines	sections thru the hull athwartships (port to starboard) at intervals along the length of the hull from stem to that part of the ship's side above the main-wales
Top Side	the timbers which form the top side.
Top Timber	height of the top timber line in the half breadth plan
Top Timber Half Breadth Line	The curve limiting the height of the sheer at the given breadth of the top timbers; TOP TIMBERS: the timbers which form the top side.
Upper Counter Rail	Counter is a part of the stern; Upper counter is the arched part of the stern above Lower counter rail; the under part of the lights (windows).
Upper Edge of the Rabbet of the Keel	Rabbet or Rebate: a joint made by a groove or channel for the purpose of securing the edge of the plank;
Upper/Lower Height of Breadth	Upper edge of the Rabbet interlocks with the upper corner of the plank.
Water Line	Two curved lines described on the sheer plan... broadest part of the hip at each timber; MAIN BREADTH: the broadest part of the ship at any particular timber or frame ... distinguished by the upper and lower arbitrary plane above the base plane except for the normal draught aka Design Water Line or Loaded waterline which is the actual water line the ship floats at
Wing Transom Roundup	WING TRANSOM: The upper most transom in the stern frame, upon which the heels of the counters are let in and rest. Roundup or the transoms: the segment of a circle to which they are sided or of beams to which they are moulded