

The Junk Rig Glossary (JRG)

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Welcome to the Junk Rig Glossary!

The *Junk Rig Glossary* (JRG) is a Member Project of the [Junk Rig Association](#), initiated by Bruce Weller who, as a then new member, found that he needed a junk 'dictionary'.

The aim is to create a comprehensive and fully inclusive glossary of all terms pertaining to junk rig, its implementation and characteristics. It is intended to benefit all who are interested in junk rig, its history and on-going development.

A goal of the JRG Project is to encourage a *standard vocabulary* to assist clarity of expression and understanding. Thus, where competing terms are in common use, one has generally been selected as *standard* (please see *Glossary Conventions: Standard Versus Non-Standard Terms*, below) This is in no way intended to impugn *non-standard* terms or those who favour them. Standard usage is voluntary, and such designations are wide open to review and change.

Where possible, terminology established by Hasler and McLeod in *Practical Junk Rig* has been preferred. Where innovators have developed a planform and associated rigging, their terminology for innovative features is preferred. Otherwise, standards are deduced, insofar as possible, from common usage in other publications and online discussion.

Your participation in JRG content is warmly welcomed. Comments, suggestions and/or corrections may be submitted to jrgeditor@gmail.com, or via related fora.

Thank you for using this resource!

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Common Terms

Aback (aka Backwinded):

A sail filled with wind on its ordinarily lee side is said to be *aback*. It may be **backed** as a manoeuvre, or *set aback* by circumstance. See **Back** and **Backwind**.

Accidental Gybe:

A **gybe** for which one is not prepared. It may arise from a wind shift or fluke, inattention at the **helm** or from sails tossed by a boat's motion in light winds. **Junk rig** is generally considered to be more forgiving of any **gybe** than other **rigs**. See **Gybe (Manoeuvre)** and **Goosewing Gybe**.

Advantage: See **Mechanical Advantage**.

Aerodynamic Theory aka Aerodynamics:

The branch of fluid dynamics dealing with the motion and physics of moving air, especially when interacting with a solid. It is generally accepted as providing the best explanation of how a sail works. [PJR p. 18] [W::Aerodynamic Theory](#) See **Aerofoil**, **Foil** and **Vortex Theory**.

Aerofoil aka Airfoil:

A streamlined surface designed in such a way that air flowing around it produces useful motion. **Aerofoil** cross-section is generally described (especially in sails) in terms of **camber**, **chord** and **depth of curve**, while efficiency is described in terms of **lift**, **drag** and **lift to drag ratio**. [W::Aerofoil](#) See **Aerodynamic Theory**, **Camber**, **Chord**, **Depth of Curve**, **Drag**, **Foil**, **Lift**, and **Lift to Drag Ratio**.

Aerofoil Curve:

Any curve approximating the cross-sectional shape of an **aerofoil**. See **Aerofoil**.

Aerojunk Rig: See *Common Junk Rigs*. [JRA: Aerojunk article](#)

Aft Led Sheets: See **Single Sheets**.

After Lift:

Lift rigged abaft the mast. See **Topping Lift**.

Angle of Incidence (aka Angle of Attack):

Apparent Wind:

The direction and velocity of wind experienced by a moving observer, which is the result of true wind modified by the observer's course and speed. Sails respond to *apparent wind*.

Airfoil: See **Aerofoil**.

Armchair Sailor:

One indulging in the pleasures of vicarious sailing. Term is most often jocular, but may on occasion be condescending.

Armchair Admiral:

Exasperated term for a person who projects expertise beyond their experience, and who may take liberties

with positions of more authoritative persons. Forum participants are encouraged to verify information presented in online discussions. See **Keyboard Captain**.

Aspect Ratio:

The proportion of height to width. For example, a *high-aspect ratio* sail is tall for its width, while a *low-aspect ratio* sail is wide for its height. *Aspect ratio* is useful for designing or comparing **junk sails**, and **foils** in general. [PJR p. 97]

Note: In other fields, this ratio may be inverted (width:height). Check context.

Automatic Rig: See *Common Junk Rigs*. [PJR p. 8]

Back:

To force or trim a sail to windward, such that it fills with wind on its ordinarily lee side. A sail in this position is said to be *backed*, or **aback**. Backing a sail may be used as a manoeuvre to force bow or stern in the direction opposite the *backwinded* sail, or to sail backwards. When **heaving to**, a *backed* foresail balances a close-hauled after sail. See **Backwind**, and alternative **Aback**.

Backwind:

To have, cause or allow wind to blow onto the ordinarily lee side of a sail. *Backwinding* may occur in a wind shift when **pinching**, causes **luffing**, and can be used as a manoeuvre to force bow or stern in the direction opposite the *backwinded* sail, or to sail backwards. Wind flow altered by a forward sail may *backwind* an after sail. See **Back**, and alternative **Aback**.

Balance:

The area of a **junk sail** (or **lug sail**) extending forward of the **mast line**, often expressed as a percentage of the sail's total area. *Balance* varies with sail shape and attitude, relative to the mast. Shape (distribution of area) and total area are adjustable via **tack parrel**, **yard hauling parrel** and **luff hauling parrel(s)**, when these are **rigged**. [PJR p. 10]

Balance:

Relationship between sail(s)' **centre(s) of effort** and a vessel's **centre of lateral resistance**. These are said to be 'balanced' when the centred helm has desired **neutral helm** or **weather helm**. *Balance* may be altered by adjustments of sail's total **centre of effort** (via **reefing** or adjustments to individual sails), **centres of pressure** (via adjustments to sail **incidence**) or of the **centre of lateral resistance** (via changes to adjustable lateral resistance devices). **Junk rigs**, particularly those with multiple sails, are very flexible in achieving *balance*. See **Lee Helm**, **Neutral Helm** and **Weather Helm**.

Balanced Helm aka Neutral Helm:

The tendency to a steady course under centred helm, neither rounding up nor falling off the wind. See alternatives **Lee Helm** and **Weather Helm**. [WGNT](#).

Ballast Stability:

Hull stability arising from ballast. Ballast may increase stability initially, by lowering a vessel's **center of gravity**, or in reserve, by increasing *righting moment* as the vessel heels. See alternative, **Form Stability**.

Barrel Method (Camber) (aka Round-Only Method):

Method for engineering **camber** in **junk sail panels** by shaping upper and lower edges to convex curves oriented away from the **bunt** (similar to barrel shape). As curves are affixed along a **batten**, they ‘collapse’ to a straight line. Fabric external to that line, in amount varying with the original curve, slackens the **bunt**. Under pressure of wind, an **aerofoil** shape results. [CP&SJR] See **Camber**, and alternatives, **Broadseam Method**, **Dart Method**, **Lens Method** and **Shelf-Foot Method**.

Batten:

A light **spar** or structure which, with other spars, spreads a **junk sail**. *Battens*, which may be horizontal or canted, extend between and are affixed to **luff** and **leech**, and generally fixed to the sail along its length by means of **batten pockets**, lashing, and/or various other means. *Battens* spread and support the sail, and provide landings for various **rigging systems**. *Battens* may range from rigid to ‘bendy’, and may incorporate mechanical means to achieve and limit curvature, and/or be themselves shaped to a given curvature. By convention, **battens** are numbered from bottom to top (the **boom** is sometimes considered the lowermost **batten** [number zero]). See **Junk Sail**, **Boom**, **Bendy Batten**, **Half Wishbone Batten**, **Hinged Batten**, **Spilling Batten**, **Tuned Batten**, **Wishbone Batten**, **Batten Parrel** and **Luff Hauling Parrel**; and **Batten Pocket**. [PJR 10, Fig. 1.4]

Batten Downhaul:

A **downhaul** affixed to one or more **battens** in order to assist lowering in extreme conditions. [PJR p. 48, Fig. 3.45]

Batten Parrel:

A **parrel** affixed to points on the same **batten**. Its principal function is to prevent a **junk sail** from blowing away from the **mast** on one tack. It may also constrain forward and/or aft motion of the sail. *Batten parrels* may be rigged long (ends affixed well clear of the **mast**) or short (one or both ends affixed close to the **mast**, limiting sail position). [PJR pp. 43-47, figs. 3.34-3.41]

Batten Pocket (aka Pocket):

Tubular **fabric** structures, sewn onto a **junk sail** along the run of a **batten**, and/or at its ends, in order to affix **batten** to sail. [PJR p. 154]

Batten Rise aka Rise aka R:

The vertical height of the **clew**, measured from the **tack**; the **foot** line is constructed from **tack** to **clew**, which determines the slope of **spars** within a **junk sail parallelogram**. *Batten rise* is generally determined by formula to produce a set amount of aft, **positive stagger**. [PJR p. 101, figs.6.15-6.19]

Batten Stagger:

The tendency of **batten** overlap at one end of the sail bundle. **Positive stagger** is overlap of lower **battens** by upper ones. **Neutral stagger** is no significant overlap. **Negative stagger** is overlap of upper **battens** by lower ones. **Positive stagger** is desirable, aft, when using **aft led sheets** because it allows **sheet spans** and **blocks** to hang freely. [PJR p. 22, Fig. 2.8]. See **Negative Stagger**, **Neutral Stagger** and **Positive Stagger**.

Bear Away (aka **Bear Off** aka **Fall Off**: To alter course away from the wind (by choice) without changing tack. See **Fall Off**.

Becket:

Landing (or fitting) on a **block** to which a line may be made fast. See **Block**.

Bendy Batten:

A **batten** engineered to flex. This is generally accomplished by (non-mechanical) means of shaping and/or choice of **scantlings** and materials. See **Tuned Battens**, and alternatives **Hinged Batten** and **Rigid Batten**.

Bermudan Rig aka Bermudian Rig aka BR:

Non-**junk** rig composed of arrangements of generally triangular sail(s). When **stayed**, it is sometimes referred to as *Marconi rig*. *Bermudan rig* has been the benchmark **rig** for **windward efficiency**.

Bias:

The diagonal directions across the **weave** of **fabric**. Diagonal stresses on **fabric** are said to be acting *on the bias*, and cause more **stretch** than orthogonal stresses, which align with **warp** and **weft**. See **Fabric** and **Sailcloth**.

Bird's Mouth Joint:

Joint commonly used for construction of round-sectioned structures (typically **spars**). Multiple staves (six and eight are common choices, resulting in hexagonal and octagonal structures, respectively) are shaped with one edge squared, and one with a precisely-angled, 90° rabbet, resembling a *bird's mouth* in section. Staves are edge-joined, with the rabbet receiving the squared edge of the adjacent stave. The method increases gluing surface area and has good, self-aligning tendencies. Many staves will also be tapered precisely, lengthways, to produce a tapered **spar**. [Duckworks Article](#).

Block:

A marine pulley, with one or more **sheaves**, used for low friction redirection of a line. A **becket** may provide a landing at the *block*. Line and **block(s)** may be combined in various arrangements to multiply **purchase**. [W::Pulley \(Block\)](#) See **Rope-Stropped Block** and **Tackle**.

Block and Tackle: See **Tackle**.

Boltrope aka Roping:

A 'rope' (term includes material such as webbing) affixed along the edges of a **junk sail**. *Boltrope* supports sail and spar weight, relieving **sailcloth** from associated tensional stresses. It further reinforces the physical connection among **spars**, tending to synchronize their motions. [PJR p. 17]

Boom:

The lowermost **batten** (zero, if numbered) of a **junk sail**. Its **scantlings** are generally increased to resist point loading from a **tackline** or **boom vang**, and may be fitted with hardware in support of **topping lifts**, **sheet leads** and other **rigging components**. [PJR p. 10] See **Batten**, **Tack Hauling Parrel**, **Boom Parrel**, **Boom Vang**, **Tackline** and **Topping Lift**.

Boom Brake:

A specialized **preventer** which constrains **boom** motion by slowing and/or stopping its swing. Uncommon in general **junk rig**. [W::Boom Brake](#)

Boom Foot Sail: See **Water Sail**.

Boom Hauling Tackle aka Boom Hauling Parrel: See **Running Tack Parrel**.

Boom Parrel:

A **standing parrel**, similar to a **batten parrel**, fitted to the **boom**, which keeps the boom from blowing away from the mast, and may constrain forward movement. [PJR p. 52] See **Batten Parrel**.

Boom Vang (aka Kicking Strap):

Control line or hydraulic system which exerts downward force on a **boom**, tensioning and flattening the sail.

Bootstrap Effect (aka Slot Effect): See **Slot Effect**.

Bowsing Tackle aka Bowsing Parrel: See **Running Tack Parrel**.

Brail:

To furl sail fully or partially, by means of a **running** lacing which gathers some or all of the **bunt** when **tensioned**. Uncommon in general **junk rig**, this method may be seen in auxiliary sails. [WGNT](#)

Broad Headed Sail:

A junk sail whose upper **panels** are wider, seen in *profile* than lower ones. [PJR p. 23, Fig. 2.10]

Broadseam Method (Camber):

Method for engineering **camber** in **junk sail panels** by increasing the overlap on seams between adjacent sail cloths, broadening them towards the upper and lower edges. This 'removes' fabric along these edges, slackening the bunt. Typically used, in **junk sails**, in conjunction with the **Barrel Method**. Under pressure of wind, an **aerofoil** shape results. [CP&SJR] See **Camber**, and alternatives, **Barrel Method**, **Dart Method**, and **Shelf Method**.

Bundle: See **Sail Bundle**.

Bunt (of Sail):

The central body of **sailcloth** within an unsupported region of sail. In **junk rig**, each **panel** has its associated *bunt*.

Bury: See **Mast Bury**.

By the Lee: See **Sailing By the Lee**.

Camber:

Three dimensional shape in a **junk sail** as a whole, or in individual **panel(s)**, approximating an **aerofoil** under pressure of wind. **Camber** is imparted to a whole **junk sail** by **twist** (under control of the **sheeting system**), **batten** bend and/or **engineered batten** curvature. *Camber* is **engineered** in a **panel** by joining shaped edges of constituent **fabrics**, to produce **chain sections** across the vertical **bunt**, and/or by selection of **sailcloth** for inherent stretch properties. For **fabric** shaping methods, see **Fabric**, **Barrel Method**, **Broadseam Method**, **Dart Method**, **Lens Method** and **Shelf Foot Method**. See **Bendy Battens**, **Hinged Battens**, **Tuned Battens**, **Sail Twist**, **Spilling Battens** and **Wishbone Battens**.

Camber aka Amount of Camber:

Amount of camber is generally expressed as the percentage of **depth of curve** to **chord**, and this amount is often referred to simply as *camber*.

Cambered Sail:

A **junk sail**, one or more of whose **panels** are **cambered** by design. See **Camber**, and alternative, **Flat Cut Sail**.

Cantilever:

To anchor an extended beam from one end. **Unstayed spars** (e.g., some **masts**, bowsprits and boomkins) are *cantilevered*. [W::Cantilever](#)

Cat Rig:

Rig in which the foremost **mast** is stepped near the bow, after a traditional North American type called a *catboat*. Types include *cat sloop*, *cat yawl*, *cat ketch* and *cat schooner*. Due to a general absence of foresails, **JR** vessels are often some type of *cat rig*.

Catenary (Curve) aka Chain Section

The idealized curve formed by suspending a uniformly limber cable between two points, or any similar curve. [W::Catenary Curve](#)

Centre of Effort aka CE:

The idealised point on the surface of a **foil**, averaging force generated across its surface. In a **sailplan**, it is located at the geometric centre of the sail area as seen in **profile**.

Centre of Lateral Resistance aka CLR:

The idealised point on a vessel's underwater **profile averaging its silhouette area**. *Rudder profile may be included in this average under various rules-of-thumb. In practice, the centre of lateral resistance is the point around which a hull turns.* [W:Center of Lateral Resistance](#)

Centre of Pressure aka CP aka CoP:

The centre of a pressure field which is the momentary locus of forces generated by that field. Nautically, this generally refers to pressure fields developed by a **foil**. It is a dynamic centre, changing with conditions (as opposed to Centre of Effort, which is a static, idealised, geometric centre). [W::Center of Pressure](#)

Chafe:

Degradation of material by friction. It is particularly noticeable in soft materials, such as **fabric**. See **Chafe Strip** and **Chafe Gear**.

Chafe Gear aka Anti-Chafe Gear:

Durable or sacrificial materials arranged to protect the vessel or its outfit from **chafe**. See **Chafe** and **Chafe Strip**.

Chafe Strip aka Anti-Chafe Strip:

A strip of sacrificial cloth added to **junk sails** under **battens**. Specialised *chafe strips* may be added to protect **sailcloth** from other **rigging components**.

Chain Section: See Catenary (Curve).

Chimney:

In **junk rig**, a vertical region adjacent to the **mast**, opposite the **junk sail**, which is not swept by **spars**

within their designed range of motion. [PJR p.34, fig. 3.6]

Chinese Gaff Rig: See *Common Junk Rigs*.

Chinese Gybe:

(Sometimes derisive) term for a **goosewing gybe** occurring on a **junk-rigged** vessel. See **Goosewing Gybe**.

Chinese Lug Rig: See **Junk Rig** and **Junk Sail**.

Chord:

An idealised, straight line connecting the leading and trailing edges of an aerofoil. See **Aerofoil**, **Camber** and **Draught**.

Clew:

The lower, after corner of a sail. [WGNT](#)

Colvin Rig: See *Common Junk Rigs*.

Compression:

'Squeezezy' forces acting longitudinally on a body from its ends toward its midbody. A body acting as a *strut* which resists *compression* or *compressive forces* is said to be acting *in compression*. In **junk rig**, **sheets** impose *compression loads* on **battens** when eased under pressure of wind. A **mast** is *compression loaded* by **tension** between **halyard** and **tack line**. [W::Compression](#) [PJR p. 13, fig 1.6] See **Shear**, **Tension** and **Torque**.

Control Line:

Any **running** line or **tackle** used to control the aspect, attitude, set or function of a **junk sail**.

Controlled Gybe:

A manoeuvre in which course is altered or sail is trimmed to induce a **gybe**. See alternative, **Accidental Gybe**.

Crab Claw Rig:

A traditional Pacific Islanders' **sailplan**, characterised by a nearly triangular sail set between two 'limbs'. In **JR**, triangular panels, when present, are similar to Crab Claw sails, and may share functional characteristics. [W::Crab Claw Rig](#)

Crease:

Tensional deformation of **sailcloth** caused by poor cut and/or poor set. *Creases* increase **drag**, degrading sail efficiency. [CP&SJR] See alternative, **Wrinkle**.

Dart:

To fold over and affix a bit of **fabric** on itself, tapering from a broad overlap to a point. A *dart* removes material away from the **bunt**, inducing approximate curvature in otherwise flat **fabric**. It is sometimes used in (generally smaller) sails to induce **camber**. See **Dart Method**.

Dart Method (Camber):

Method for engineering **camber** in (generally smaller) **junk sail panels** by **darting panel** edges, fore and aft. This 'removes' **fabric** along these edges along an approximate curve, slackening the bunt. Under press of wind, an **aerofoil** shape results. [CP&SJR] See **Camber**, and alternatives, **Barrel Method**, **Broadseam Method**, **Lens Method** and **Shelf-Foot Method**.

Depth of Curve:

The depth of a **foil**, measured perpendicular to its **chord** from its point of greatest curvature.

Developed Surface aka Developable Surface:

A surface entirely composed of **section-of-cone** and **section-of-cylinder** areas, smoothly joined. Such a surface may be covered by stiff, sheet construction materials, such as plywood or metal. *Developed-surface* hulls are especially amenable to **Do-It-Yourself** construction.

Do It Yourself aka DIY:

The movement towards self-sufficiency, empowerment and independence. **Junk rig** is particularly amenable to *DIY* approaches due to its economy and simplicity of design, construction and maintenance.

Double-Blocked aka Chock-a-block aka Two Blocks:

Situation where two **blocks** sharing a **tackle** are drawn into contact, limiting further range of motion.

[WGNT](#)

Double Sheets (Port and Starboard):

The use of two, separate **sheeting systems**, one for the port side and one for starboard. This type of *double sheeting* allows there to be a narrower gap between sails, and for backwinding, under control of the windward **sheets**, for manoeuvring or **heaving to**. This type of *double sheeting* is common in the East, though less so in the West. Unless otherwise specified, this is the type generally implied. [PJR p. 73, Fig. 4.47] See **Double Sheets (Upper and Lower)**, and alternatives, **Aft Led Sheets** and **Single Sheets**.

Double Sheets (Upper and Lower):

The use of two, separate, **aft led sheets**, one controlling the upper **leech**, and one controlling the lower **leech**. This type is sometimes used to improve control of sail **incidence** and **sail twist**, especially in large **junk sails**. See **Double Sheets (Port and Starboard)**, and alternatives, **Aft Led Sheets** and **Single Sheets**.

Downhaul:

A **control line** which **tensions** a **junk sail's** upper **spars** in order to assist lowering in extreme conditions. [PJR p. 48] See **Batten Downhaul** and **Yard Downhaul**.

Downwash:

Divergent flow opposite a **foil's** convex side. In a sail (vertical **foil**), *downwash* is a transverse motion, diverting toward the wind. See **Foil** and **Upwash**.

Dmin aka Minimum Drift:

The minimum **drift** required for full and proper function of a **rigging system**. [PJR pg. 63]

Draft:

American spelling of **Draught** (British usage). See **Draught**.

Drag:

Friction from a fluid or gas flowing across a **foil**. See **Aerodynamic Theory**, **Lift to Drag Ratio**, and alternative, **Lift**. [W::Drag](#)

Draught aka Draft:

The maximum extent of a vessel below its **waterline**. *Draught* is British usage, while *draft* is American usage.

Drift:

The limit (and sometimes range) of motion of specific **rigging** (such as a **block**) constrained by its **rigging system**. [PJR pg. 63]

Drogue:

A drag device deployed into the sea from the stern, which slows a vessel's forward velocity. It is generally deployed as a heavy-weather technique, and/or when a vessel is in danger of surfing down the face of a wave, risking a broach or burying in the backside of the wave ahead. See alternatives, **Heave To**, **Lie A-hull**, **Sea Anchor** and **Weathercock**.

Elastic:

The ability both to **stretch** under **tension** and recover to (near) original dimension when **tension** is released. In **junk rig**, *elastic fabric* may be used for **sailcloth**, and *elastic* line for anchoring or **sheets**.

End View:

See **Section View**.

Engineer:

To construct a **rigging component** to behave in a given way by design. Methods include selection and/or shaping of materials, and/or mechanisms in support of the desired behaviour.

Euphroe:

A type of **friction block** often used in **junk rig sheeting systems** (especially in Asia), with one or more upper holes through which line(s) may freely run, and which may incorporate one or more **sheaves** in its base. [PJR p. 59-61, Figs. 4.9-4.21 and 4.51-4.52] See **Friction Block** and **Sheets**.

Fabric aka Cloth:

Filaments, threads and/or yarns of natural or synthetic fibers woven in a particular weave. Edges may be selvaged, or not. Various fabrics are specialised for weight, thread count, strength, stability, elasticity, UV resistance (resistance to sunlight), hydrophobia (resistance to water absorption), waterproofing and colour. Fabric is generally sold by length from bolts or rolls of varying width.
[W::Fabric](#) See Sailcloth.

Fall Off (aka Bear Off or Bear Away):

To wander away from the wind (inadvertently) without changing tack, risking sail **stall**. See alternative

Bear Away.

Falling Leaf Pattern:

Poetic phrase describing the motion of a **yuloh** blade through water. Named for the (approximately) two dimensional pattern of a leaf, which arcs to and fro as it falls. See **Yuloh**.

Fan:

Junk sail region whose **profile** is characterized by **spars** canted, fan-wise, with increasing angle from **boom** to **yard**, resulting in quasi-triangular **panels** and **roach**. **Scallop** developed by flat-cut, *fanned* panels are approximately conic in section. **Cambered panels** may affect **furling** properties. See **Fanned Sail, Irregular Fan, Regular Fan** and **Roach**, and alternative, **Parallelogram**.

Fanned Planform: See **Fanned Sail**.

Fanned (Sail) aka Fanned Planform:

A **junk sail** which is mostly or entirely **fanned**. It is generally accepted that *fanned sails* enhance the control of **sail twist**-induced **camber**; as canted **battens twist**, the horizontal sail section assumes an **aerofoil** shape, whose **depth of curve** is proportional to amount of **sail twist**. **Camber** may also be shaped in one or more **panels**. A *fanned sail* generally has some **roach** which may foul **aft led sheets**. It may extend one or more **battens** from the **leech** to compensate, or employ **double sheets**. **Negative stagger**, forward, may bring the forward end of the **yard** abaft the **mastline** when **reefed**, and may extend the **yard** forward of the **luff** to compensate. See **Camber, Double Sheets, Regular Fan** and **Irregular Fan**, and alternative **Parallelogram Sail**.

Fantail Rig: See *Common Junk Rigs*.

Fan Up:

The lifting of furled **panels** from the **sail bundle** by wind (most often from astern). Generally, this affects the after end of **panels** and attached **spars** most strongly. The overall effect resembles the unfurling of a fan, regardless of sail geometry. As after ends of **spars** raise upwards, the forward ends may depress and foul the **mast, rigging** or **bunts** of sail, and/or result in a **goosewing gybe**. Various **preventers** may be rigged to limit *fan up*. [PJR p. 208, Fig 15.4] See **Fan Up Preventer** and **Goosewing Gybe**.

Fan Up Preventer (aka FUP):

Any of various **rigging systems** which prevent **fan up**. Generally, these are temporarily **rigged**. See **Fan Up**.

Feet-Inches-Eighths:

A method of representing measurements within the **imperial system**, in which fractional forms are not used (all are converted to eighths-of-an-inch). For example, *eight feet, four and three quarters* inches would be represented as 8-4-6 (eight feet-four inches-six eighths). A trailing plus or minus ('+' or '-') may be appended to adjust the value up or down by 1/16th of an inch and a second to adjust by 1/32nd of an inch. Where the **imperial system** is being used, *feet-inches-eighths* is commonly used in **lofting** of hulls and sails for improved clarity over other methods. See **Imperial System**.

Fenix Rig(s): See *Common Junk Rigs*.

Filament:

A linear strand of material, which may be solid or hollow. **Fabric** and line made directly from *filaments*

are often stronger than alternatives, and may have other associated effects. See **Fabric** and alternatives, **Thread** and **Yarn**.

Flat Cut (Sail):

Any sail without initial **camber** engineered into its **panels**. *Flat cut junk sails* produce some **camber** in their **panels** through **batten** bending and **sailcloth** stretch. They produce whole sail, **camber** by allowing and controlling **sail twist** to adjust **depth of curve**. See **Camber**, **Fanned Sail** and **Parallelogram Sail**, and alternative, **Cambered Sail**.

Flat Sheeted: See **Sheeted Flat**.

Foil:

A streamlined surface designed in such a way that fluid flowing around it produces useful motion. This term is often used to describe shapes which are **hydrodynamically** and/or **aerodynamically** efficient. See **Aerodynamic Theory**, **Aerofoil**, **Downwash**, **Drag**, **Hydrodynamic Theory**, **Lift**, **Lift to Drag Ratio** and **Upwash**.

Foot:

Lower edge of sail. In **junk rig**, a **boom** is affixed along the *foot*, and occasionally a **watersail**. [WGNT](#)
See **Watersail**.

Force Vector: See **Vector**.

Fore Lift aka **Forward Lift:**

A **lift** forward of the **mast**, **rigged standing** or **running**. In **junk sails** with a large **balance**, it may have a **sail gatherer** towards the lower portions. This term is widely used, but doesn't appear in **PJR**, which conflates **forward lift** with **mast lift**. [CSR pp. 4-5, figs. 1-2] [PJR p. 51 figs. 3.49-3.50] See **Mast Lift**.

Form Stability:

Vessel stability arising from hull shape. On a given footprint, the less the hull is cut away from the rectangular slab measuring length x beam x draught, the greater the *form stability*. See alternative, **Ballast Stability**.

Forward Lift: See **Fore Lift**.

Free Standing Mast: See **Unstayed Mast**.

Free Standing Rig: See **Unstayed Rig**.

Friction Block:

A **sheaveless block**. In **junk rig**, *friction blocks* may be used in **sheeting systems** to resist free movement of **running lines** toward equilibrium under pressure of wind, allowing the **leech** to be set to and retain a given shape. See **Euphroe**.

Furl: See **Reef**.

Furled Bundle: See **Sail Bundle**.

Gaff Rig (aka GR):

Non-**junk** rig composed of arrangements of quadrilateral sail(s) depending from a **spar** called a *gaff*, which is affixed along the sail's head; the sail is constrained along its luff to the mast. *Gaff sails* are usually supplemented by smaller, triangular sails. [W::Gaff Rig](#)

Ghoster:

A light, battenless **headsail**, often quite large, for use in very light wind. [PJR 78, Figs. 5.1-5.8]

Goosewing Gybe (aka Chinese Gybe):

A partial, or incomplete **gybe** in which the lower sail **gybes**, but the upper sail does not, or *vice versa*. In quadrilateral sails, this puts the **head** and **foot** of the sail on opposite sides along with the attached **spars**. Often, the **boom**, and possibly other **spars** will **fan up**, slackening the **leech**, leading to or exacerbating the situation. Sheeting well in before executing a controlled **gybe** generally prevents **fan up** and subsequent *goosewing gybe*. In **junk rig**, sheeted, full length **battens** reduce the risk of **fan up** and *goosewing gybe*.

[WGNT](#)

Grommet: See **Rope Grommet** or **Sail Grommet**. [WGNT](#)

Gurney Flap:

A vertical section of **fabric** running along the **leech** of some **junk sails**, which recurves to windward. This may be integral to each **panel** or extend abaft the **leech** proper (in which case it takes its angle of incidence from **aft led sheets**). It is generally considered to degrade **windward efficiency** by increasing **drag** and moving the **centre of pressure** aft, and has not been widely adopted.

Gybe aka Jibe (noun):

A situation in which the wind, blowing from aft, rounds the leech of a sail, throwing it suddenly from one side to the other. Unlike a tack, at no point is the sail depowered. **Junk sail balance** reduces the force of a *gybe*, and where **shrouds** are absent there is no potential for impact between them and the **boom**. See **Accidental Gybe**, **Controlled Gybe**, **Goosewing Gybe**, **Gybe** (verb), and alternative, **Tack** (noun).

Gybe aka Jibe (verb):

A manoeuvre in which course or sail incidence is altered to bring the wind from one side of the sail to the other, incurring a **gybe** (noun). [PJR p. 208] See **Accidental Gybe**, **Controlled Gybe**, **Goosewing Gybe** and **Gybe** (noun).

Half Wishbone Batten: See **Spilling Batten**.

Halyard:

The **control line** used to raise and lower sail. In **junk rig**, it is often attached to a **halyard crane** and a **sling point** on the yard, with the fall led to deck level, and **rigged** to provide considerable **mechanical advantage**. It may raise the sail until **double blocked** or countered by a **tack line**. [PJR pp. 32-37, figs. 3.1-3.16] See **Halyard Crane**, **Sling Point**, **Tack Line** and **Yard**.

Halyard Crane (aka Masthead Crane):

An extension off the **masthead** to which the upper **halyard block** affixes. It is offset, precisely, to accommodate a **junk sail's** offset **yard**, and is long enough to prevent **blocks** from **chafing** against the **masthead**. [PJR p. 133, figs. 8.19-8.21]

Hasler/McLeod Rig: See [PJR p.30, Fig. 2.25] See Common Junk Rigs.

Head:

The upper edge of a quadrilateral sail. In **junk rig**, the head is affixed to a **yard**. [WGNT](#)

Head Sail aka Headsail:

Any sail set ahead of the foremost mast. Generally, a triangular sail set from a forward **stay**. In **junk rig**, *foresails* must function clear of a **junk sail's balance**. They tend to be relatively small, therefore, or not used. There are many exceptions, however, including the special case of **Aerojunk rig**. See **Aerojunk Rig** and **Colvin Rig**.

Heave To:

A sailing manoeuvre which brings a vessel to a near stand-still, possibly fore-reaching slightly and making **leeway**, while taking waves on a forward quarter. Motion is reduced, even in very poor conditions. After sail is generally **sheeted flat**, and the tiller often lashed to leeward, heading the bow into the wind.

Forward sail, may be backed, as well, balanced against the drive from the after sail. A vessel may be *hove to* as a storm tactic, a stand-on manoeuvre, or to relieve crew. [PJR p. 208] See **Weathercock** and alternatives, **Drogue**, **Lie Ahull** and **Sea Anchor**.

Heel of Mast: See **Mast Heel**.

Helm:

The steering station (US), and/or steering mechanism of a vessel (e.g., tiller, wheel or **whipstaff**). [W:Helm](#) See **Lee Helm**, **Neutral Helm** and **Weather Helm**.

Hem:

To fold over an edge of **fabric** one or more times and fix in place (generally by sewing). The resulting *hem* stops fraying, helps protect the edge of the **fabric** from **chafe**, and reinforces it against **tensional** stress. In **junk sails**, *hems* are sometimes used instead of **roping**.

Hi-Power Rig: See Common Junk Rigs.

Hinge and Stop Batten: See **Hinged Batten**.

Hinged Batten (aka Hinge and Stop Batten):

A segmented **batten**, hinged at the joints, with stop mechanisms to limit range of its hinges' motion. Generally, the stops are **engineered** to approximate an **aerofoil curve**. Under wind pressure, the sail presses **battens** out to their stops, making on an **aerofoil** shape.

Hollow:

Concavity cut into the **leech** between **spars**. This may help tame fluttering, and, when extreme, moves that **panel's Center of Effort** forward/inboard.

Hong Kong Parrel:

Rope **parrels**, additional to **batten parrels**, running diagonally aft from the forward part of one **batten** to the next lower **spar**. They constrain **batten** movement, relative to one another, improving the set of their associated **panel**. They can, however, impose heavy stresses mid-**batten**. [PJR p. 46, figs. 3.40-3.41]

Horizontally Hinged Hybrid Rig aka Triple H Rig:

See **Common Junk Rigs**.

Horizontal Hinge Method (Camber):

Method for engineering **camber** in **junk sail panels** by extending the upper and lower edges from the **batten** toward the **bunt** (similar to **shelf foot method**) by means of alternating pockets, fitting round the bounding **battens** in the manner of a door hinge (**battens** serving as 'hinge pins'). As hinges of varying length are affixed along a **batten**, they add their length to the vertical distance, measured across the **bunt**, creating commensurate slack. Under wind pressure, an **aerofoil** shape results. See **Camber**, and alternatives, **Barrel Method**, **Broadseam Method**, **Dart Method**, and **Shelf Method**.

Hullform:

A general class comprising hulls related by shape, history and/or features (e.g., *sharpie*, *dory*, *Colin Archer* and *junk*).

Hydrodynamic Theory aka Hydrodynamics:

The branch of fluid dynamics dealing with the motion and physics of moving water, especially when interacting with a solid. It is generally accepted as providing the best explanation of how a hull works. [W::Hydrodynamic Theory](#) See **Foil** and **Vortex Theory**.

Imperial System:

System of measurement based on factors of 12 (1,2,3,4,6,12) and rational fractions based on denominator powers of 2 (1,1/2,1/4,1/8,1/32,1/64, etc.). Still widely used in the USA, it has for the most part been replaced by the **metric system** world-wide. [W::Imperial System](#) See **Feet-Inches-Eighths**, and alternative, **Metric System**.

Incidence (Angle) aka Angle of Attack:

The angle of a **foil** relative to a reference line. Generally, in boats, the angle will lie in **plan**, relative to the centreline of the boat (in the case of, say, a rudder), or the wind (in the case of a sail). http://en.wikipedia.org/wiki/Angle_of_incidence **W::Incidence**] [W::Angle of Attack](#)

Irregular Fan:

A **fanned** region of a **junk sail** whose **spars** do NOT radiate from a single point. [**PJR** p. 29, figs. 2.21-2.24]

Jester Rig: See Common Junk Rigs.

Jiblet:

Forward, **balance** portion of a **panel** within a **split junk rig**, forward of its slot. A *Jiblet* establishes **slot effect** for the after portions of its (generally **cambered**) **panel**, increasing total **lift to drag ratio** (sail efficiency). See **Slot Effect** and **Split Junk Rig**.

Jibe: See **Gybe**.

Jointed Batten aka Segmented Batten:

Any **batten** which is segmented, and joined by flexible joints. Generally some stop mechanism will be

engineered to limit degree of flex. See **Bendy Batten** and **Hinge and Stop Batten**.

Junk (aka Sampan [rare]):

Term loosely applied to a broad class of traditional, eastern **hullforms**, generally characterised by high sterns and sometimes, a widened foredeck. If a sailing hull, the rig is usually **junk rig**.

Junk Sail:

A **standing, lug sail** which is fully **battened** from **luff** to **leech**, with a **sheeting system** extending to all or most of the **battens**. Common usage often refers to the sail inclusive of its attached **spars (yard, battens and boom)**. [PJR Chapters 2 and 3]. See **Junk Rig**.

Junk Rig (aka JR):

Fore and aft **rig** composed of one or more **junk sails** and all associated **spars** and **rigging**. [PJR Chapter 1] [W::Junk Rig](#)

Jury Rig:

A temporary **rig** improvised until repairs are possible. **Unstayed masts**, when used, and multiple battens present many opportunities for *jury rigging*. [PJR p. 214]

Keyboard Captain:

Exasperated term for an online person who projects expertise beyond their experience, and who may take liberties with positions of more authoritative persons. Forum participants are encouraged to verify information presented in online discussions. See **Armchair Admiral**.

Kicking Strap: See Boom Vang.

Kick-Up Rudder:

A rudder designed to be raised in shoal water. It may be raised manually, or automatically on contact with the bottom.

Lateral Resistance:

Resistance to transverse (lateral) motion. Generally, the lateral motion to be resisted is **leeway**. Structures providing *lateral resistance* slide forward relatively easily, and sideways relatively poorly. *Lateral resistance* is proportional to the **profile**, silhouette area of the structure or device, but may be enhanced by **sectional** shape. *Lateral resistance* can be provided by the **hull** itself, *keels, centreboards, leeboards, daggerboards* and *rudders*. When working to windward, *lateral resistance* counters lateral components of sail **lift**, leaving a net, windward **force vector**. [W::Lateral Resistance](#) See **Centre of Lateral Resistance, Leeway** and **Vector Analysis**.

Lazy-Jack: See Topping Lift.

Lead:

The angles at and along which a line is led. [WGNT](#)

Lead:

The amount by which the sail plan's total **centre of effort** is forward of the **centre of lateral resistance**. Generally expressed as a percentage of the **waterline length**. The amount of *lead* is generally determined by rule-of-thumb, taking into account sail and hull characteristics. [PJR p. 94] [W:Balance of Forces](#)

Lee:

The direction away from the wind.

Lee (In the lee of):

The side away from the wind.

Lee Helm:

The tendency to fall off the wind, despite a centred **helm**. [W::Lee Helm](#) See alternatives, **Balanced Helm** and **Weather Helm**.

Leech:

After edge of sail. [WGNT](#)

Leeward:

The direction generally opposite the wind.

Leeway:

Travel or drift to **leeward**. In sailing, this may be expressed as an angle of **incidence**, or as a transverse **vector**. [W::Leeway](#)

Length Above Partners aka LAP:

Height of a **mast** measured from **partners** to **mast head**. This value is especially useful for calculating **mast diameter** and **mast bury** in **unstayed masts**. See **Mast Bury**, **Mast Diameter** and *Common Formulae and Ratios*.

Lens Method (Camber): See **Shelf Method**.

Lie Ahull:

To drift, beam on to wind and seas. **Junk sails** may remain fully or partially raised, and allowed to **weathercock** with eased **sheets**. [PJR p. 208] See alternatives, **Drogue**, **Heave To**, **Sea Anchor** and **Weathercock**.

Lift (Rigging):

Standing and/or **running rigging system** comprising lines led to and from the **masthead**, around the **boom** via positioning eyes. *Lifts* support the **sail bundle**, and gather the **junk sail** and attached **spars**. If **rigged running**, they may adjust the height and slope of the **sail bundle**. The lower portions may bifurcate one or more times, and/or have a **sail gatherer** attached. See **After Lift**, **Forward Lift**, **Mast Lift**, **Topping Lift**, **Sail Bundle**, **Sail Gatherer** and **Upward Reef**.

Lift aka Aerodynamic Lift aka Hydrodynamic Lift:

Force produced by a **foil**, at roughly right angles to the foil on its convex side, as wind or water pass across it. *Lift* is generally depicted by a **force vector** and subject to **vector analysis**. Efficient **foil** shapes cant this **force vector** toward the **foil's** leading edge. Sails generate *lift*, whose transverse **vector** components

are countered by **lateral resistance**. [W::Lift](#) See **Aerodynamic Theory, Hydrodynamic Theory and Vector Analysis**.

Lift to Drag Ratio

Measure of efficiency of a **foil**. The higher the ratio, the greater the efficiency. [W::Lift to Drag Ratio](#) See **Aerodynamic Theory, Drag and Hydrodynamic Theory**.

Loft:

To lay out cut, join, place and fold lines and points, full sized, onto construction materials. Often, this involves curves which may be *lofted* with the help of a *batten*. Generally, sails and hulls are *lofted*.

[W::Lofting](#)

Long Batten Parrel: See **Batten Parrel**.

Loom:

The long, central shaft of an oar, **yuloh** or **ro**. [WGNT](#)

Luff:

The forward edge of sail. [WGNT](#)

Luff (Sail):

The **luff** (forward edge of sail) is said to *luff* as wind from forward begins to round to the lee side of the sail, indicating that one is **pinching**. The **luff** of a **flat-cut junk sail** is tensioned by the weight of the lower **panel** and **boom**, so tends to *luff* late, giving tardy warning of **pinching**. See alternative **Stall**.

Luff aka Luff Up:

To round up into the wind far enough to reduce sail drive. This point is often indicated by **luffing** and reduced angle of heel. It can be a technique temporarily to reduce sail power in a gust, or to aid timing in making an entrance. See alternative **Bear Away**.

Luff Hauling Parrel (aka LHP):

Running luff parrels(s) allowing adjustment of the **luff's** position on the **mast**. **Tensioning** hauls the **luff** (and **junk sail**) aft, countering a **junk sail's** general tendency to swing forward under the influence of gravity, possibly distorting sail shape in the process; easing allows it to swing forward. Separate *luff hauling parrels* may be rigged to control some or all of the **luff**. Generally, control of mid- to upper **luff** is considered sufficient for good sail set. [PJR p. 47, figs. 3.42-3.44]

Luff Parrel:

Any **parrel** which constrains and/or controls the **luff** of a **junk sail**. A *luff parrel* may be **standing** or **running**, and several of either or both may be **rigged** in one sail. [PJR pp. 44-48, figs. 3.35-3.44] See **Luff Hauling Parrel, Standing Luff Parrel and Throat Hauling Parrel**.

Lug:

The **spar** from which a **lug sail** depends. In **junk rig**, the convention is to refer to it as a **yard**. See **Yard**.

Lug Rig:

Vessel **rigged** with one or more **lug sails** and all associated **rigging**. **Lug sails** are **rigged** either *standing*

(sail always on one side of its **mast**) or *dipping* (sail is transferred from one side of its mast to the other by lowering (dipping) the **lug** and bringing it across while near vertical). [W::Lug Rig](#)

Lug Sail:

Quadrilateral sail suspended from a **lug**, extending forward of the **mast** forming sail **balance**, and held in place at the bottom by the **sheet** and **tack downhaul**. See **Chinese Lug Sail, Junk Sail Lug Rig and Yard**.

Mallory Rig: See [Common Junk Rigs](#).

Mast:

Principal, vertical or **raked spar**, on which sail is set. In **Junk Rig**, it is generally circular in section, conic in profile, tapering from full **mast diameter** at the **partners** to half or less that at the **masthead**, and often **free-standing**. It may be constructed *solid* (usually of grown timber or laminated wood), or *hollow* (from hollowed timber, wooden staves, drawn aluminium, galvanized steel or fiber/resin composite). A *mast* is subject to **compression** loading from **tension** between **halyard** and **tack line**, and **torqued** by the **halyard** and **halyard crane**. *Mast flex tensions* the windward side and **compresses** the leeward side (approximately speaking). [PJR Chapter 8] See **Mast Bury, Mast Diameter, Mast Rake, Masthead, Mast Heel, Mast Step, Partners** and **Tabernacle**.

Mast Bury:

The proportion of a **cantilevered, unstayed mast** below **mast partners** to its length. In **free-standing masts**, adequate *mast bury* is essential, with a minimum of 9% of the **mast's** overall length, or about 10% of its **length above partners**. [PJR p. 115] [CSR p. 38, fig. 9]

Mast Diameter:

The diameter of a **mast** at any given point along its length. In Junk Rig circles, it generally refers to the point of widest diameter, just above the partners, unless noted otherwise. A **Junk Rig mast** is generally circular in section, and tapers from full diameter, just above the **partners** to one half or less of that at the **masthead**. *Mast diameter* is generally calculated by formula according to material, height of **mast**, sail area, and beam of vessel, and augmented by a safety factor. [PJR p. 121, Fig. 8.2] See **Mast** and **Common Formulas**.

Mast Head: See **Masthead**.

Mast Heel aka Heel of Mast:

Lower end of the **mast**, stepped in a **mast step** or fixed (in a **tabernacle**) by a **mast stop**.

Mast Lift aka Forward Lift:

A **standing** or **running lift** gathering and supporting the **sail bundle** at the **mast**. **PJR** uses the same term for a **lift** rigged forward of the **mast**, but many prefer to draw a distinction, using *forward lift* in this case. See **Forward Lift, Lift** and **Topping Lift**. [PJR pp. 50-51, Figs. 3.49 and 3.50]

Mast Line aka Mastline (aka ML):

The designed or actual position of the **mast** across its associated **junk sail**. If the sail's position on the **mast** is adjustable, there may be more than one *mast line* specified, generally at the limits of adjustment range(s). [PJR p. 109, fig. 6.28]

Mast Partners:

The structures supporting a stepped **mast** at deck or cabin-top. [PJR pp. 141-145, figs 9.1-9.7] See **Mast Step**.

Mast Pivot:

In a **tabernacle**, the point around which a **mast** pivots when lowered. Generally, a hinge structure is arranged around a **pivot bolt**, from which the mast is hung. Generally, the **pivot bolt** determines the point from which **mast bury** is determined. See **Tabernacle**.

Mast Position:

The position of a **mast** within the hull.

Mast Rake aka Rake:

Inclination of a **mast**, fore or aft, from vertical. In still conditions *mast rake*, in conjunction with gravity, influences the rest position of a **junk sail**. If **raked** forward, the tendency is to swing outboard. If **raked** aft, the tendency is to swing inboard. If vertical, there is no tendency to swing (random rest position within range of permitted swing). Forward *mast rake* is generally considered to be helpful in spreading sail in light airs and to delay a **gybe**. [PJR p. 40, figs. 3.21-3.23] See **Rake**.

Mast Step:

The structure receiving, supporting and securing a **mast heel**. A **mast** may be *stepped* at the keel, the deck or in a **tabernacle**. See **Mast** and **Tabernacle**.

Mast Stop:

In a **tabernacle**, a means of affixing the **mast heel**. In conjunction with the **mast pivot** and **tabernacle** structure, it holds the **mast** in cantilever. See **Tabernacle**.

Mast Topping Lift: See **Topping Lift**.

Masthead aka Head of Mast (aka Mast Head):

Upper end of **mast**, to which a **masthead fitting** may be affixed. [WGNT](#)

Masthead Crane: See **Halyard Crane**.

Masthead Fitting aka Masthead:

Fabricated hardware mounted at the **masthead** to provide landings for all lines led to the **masthead** (e.g., **halyard**, **lifts**, **stays**, etc.), and additional **masthead** hardware (e.g., antennas, windvanes, etc.). See **Masthead Crane**. [PJR p.133, figs. 8.19-8.21]

Mastheel: See **Mast Heel**.

Mastline: See **Mast Line**.

Mechanical Advantage aka Advantage:

A measure of the force amplification achieved by using a tool, mechanical device or machine system. Typically, *advantage* is expressed as a ratio of force output to force input. For example, a system with mechanical advantage of 3:1 (spoken *three to one*) generates total force approaching three times the input force, but takes three times as long to do the same amount of work as a 1:1 system. In all hardware systems,

some force is lost to friction between parts in relative motion.. [W::Mechanical Advantage](#) See **Purchase**.

Metric System:

System of measurement based on powers of 10 (... ,1/1000,1/100,1/10,1,10,100,1000,...). Metric has become the standard, world-wide, though the **imperial system** is still widely used (outside the scientific community) in the USA. [W::Metric System](#) See alternative, **Imperial System**.

NACA Aerofoil:

A protocol to specify **Aerofoil** shapes developed by the *National Advisory Committee for Aeronautics* (NACA, predecessor to NASA). **Aerofoil** shape is described using a series of digits following the word NACA. Parameters in the numerical code can be entered into equations to precisely determine the cross-section of the **aerofoil** and calculate its properties. [W::NACA Aerofoil](#)

Negative Stagger:

Among **battens** **furled** into the **sail bundle**, overlap of upper **battens** by lower ones. *Negative stagger* at the aft end of the **sail bundle** may foul **aft lead sheets**. At the forward end, excessive *negative stagger* may critically reduce or eliminate extension of **battens** and/or **yard** forward of the **mast(line)**, leading to fouling if uncompensated. [PJR p.22, fig. 2.8]

Neutral Helm: See **Balanced Helm**.

Neutral Stagger:

No significant overlap among **battens** **furled** into the **sail bundle**. **Neutral stagger** at the aft end of the **sail bundle** may foul **aft lead sheets**. *Neutral stagger* may result from **camber** cut into **junk sail panels**, and may require compensating **rigging** or geometry to force aft, **positive stagger**.

P (Panel Height):

In some discussions, refers to height of a **panel**, understood as a variable for some exact value. Where it is measured varies. Check context. See **Panel Height**. [PJR p. 96, fig. 6.8]

Panel:

In a **junk sail**, **sailcloth** separated by **spars** and, by **JRA** convention, numbered from the lowermost (number one) upward. These may be sewn from multiple pieces of **fabric** and **pocketed**, or **grommeted** and lashed for attachment of **spars**. [PJR p. 5]

Panel Height (aka P):

The height of a given **panel**. It is often measured precisely along the **leech**, but may also be used generically without reference to a precise value. Check context. [PJR p. 96, fig. 6.8]

Parallelogram:

Area of a **Junk sail** whose **profile** is characterized by parallel edges and **spars** of constant length. Generally, these **spars** are canted by a precise amount of aft elevation (**batten rise**) to yield **positive stagger** at the after **sail bundle**. **Scallop** developed by flat-cut, parallel panels are approximately cylindrical in section. **Cambered panels** may affect **furling** properties. *Parallelograms* are often incorporated into **junk planforms** for their constant **furling** qualities and straight **leech**, which work well with **aft lead**

sheets. See **Rise**, and alternative **Fan**.

Parallelogram Planform: See **Parallelogram Sail**.

Parallelogram Sail aka **Parallelogram Planform:**

A **junk sail** embodying a significant **parallelogram**. Generally, the **parallelogram** is **engineered** for **positive stagger** at the after **sail bundle**. [PJR p. 24, fig. 2.11] See **Rise**, and alternative, **Fanned Sail**.

Parrel:

Any one of a number of **junk rig** lines passing from **spar**, across or around the **mast**, to **spar**, and any associated **rigging**. *Parrels* may be **rigged standing** or **running** (the latter often designated as a *hauling parrel*). They are used to position, constrain and control the **junk sail**. See **Batten Parrel**, **Boom Parrel**, **Boom Hauling Parrel**, **Luff Parrel**, **Snotter**, **Throat Hauling Parrel**, **Tack Parrel**, **Yard Hauling Parrel** and **Yard Parrel**. [PJR pp. 42-48, figs. 3.30-3.44]

Partners: See **Mast Partners**.

Peak:

The aft, upper corner of a quadrilateral sail, including the **junk sail**. [WGNT](#)

Peak Up (the Sail or Yard):

To raise or **tension** the **peak**. In practice, the after end of the **yard** is **tensioned** (*peaked up*) by downward **tension** at the **throat**, and/or by moving the **sling point** aft. See **Sling Point** and **Throat Hauling Parrel**.

Pinch:

To point so high into the wind that sail **lift** diminishes or fails (**luffs**). **Flat cut junk sails** tend not to signal *pinching* by sail flutter along the **luff**, so extra attention from the helm is required. [WGNT](#)

Pivot Bolt (Tabernacle):

In a **tabernacle** a transverse bolt arranged in a hinge arrangement with **mast** and **tabernacle** structure, from which the **mast** is hung, and around which it pivots while lowering. See **Mast Pivot**.

PJR (*Practical Junk Rig*): See *Practical Junk Rig*.

Planform (aka **Sail**):

A family of sails and variants whose geometry follows a particular set of guidelines or tradition, and individual sails within such a family. For example, "The Reddish *planform*(or Reddish *sail*) is **fanned**." Often a *planform* will have certain **rigging** strongly associated. See **Rig**, **Sailplan** and *Common Junk Rigs*. [JRA]

Plan View:

View from top or bottom (as specified). Deck and interior layouts are generally presented in *plan view*. [WGNT](#) See **Profile View**, **Section View** and **View**.

Pointing Ability:

The angle of **incidence** of a vessel's heading relative to the wind. A vessel which is *able to point* high into the wind (low angle of incidence) is said to have greater *pointing ability*. Generally, **junk rigged** vessels have had less *pointing ability* than, say, **Bermudan rig**, though recent developments are promising.

Pointing ability is just one factor in **windward efficiency**. See **Aerojunk Rig, Camber, Slot Effect, Split Junk Rig** and **Windward Efficiency**.

Positive Stagger:

Among **battens** furled into the **sail bundle**, overlap of lower **battens** by upper ones. Adequate *positive stagger* at the after **sail bundle** lets **sheet spans** hang clear of **battens** and one another, virtually eliminating fouling of **aft lead sheets**. *Positive stagger* is generally **engineered** via sail geometry, but may be imposed by various **rigging**. [PJR p.22, fig. 2.8 and Chapter 2]

Practical Junk Rig aka **PJR** (aka **JR Bible**):

Book by HG Hasler and JK McLeod containing detailed analysis of general **Junk Rig** construction and use. Originally published in 1988, its update is currently the subject of a [JRA Member Project](#). See [Sources](#).

Preventer:

Any line (often temporary), **rigged** to constrain movement of **spars**. They may be **rigged** to prevent or reduce accidental **gybes**, **fan ups**, **sail twist**, etc.. See **Boom Vang** and **Kicking Strap**.

Profile View:

View from port or starboard (as specified). Known as 'side elevation' in architecture. Sails are presented in **profile view** by convention. [WGNT](#) See **Plan View, Section View** and **View**.

Purchase:

Mechanical advantage derived from **block** and **tackle** or similar arrangements. Generally, *advantage* equals the number of line parts in motion (i.e., not affixed) relative to the **block** hauling a load, minus a percentage of loss to friction. In **junk rig, halyards**, hauling **parrels** and **sheet systems** apply *purchase* in varying amounts to control the **rig**. [W::Purchase](#) See **Block and Tackle, Mechanical advantage** and **Tension**.

Quilting:

The diamond pattern formed in some (especially some traditional) **junk sails** by stitching and/or reinforcing strips. **Aerodynamic** benefits, if any, are contested.

R ((Batten) Rise):

In some discussions, refers to **batten Rise**, understood as a variable for some exact value. Check context. See **Batten Rise**.

Rake:

Said of a structure which has been inclined from vertical (e.g., a **mast**, bow or transom). Generally, the subject is specified initially for a given discussion, which is then assumed until further notice (e.g., "Our **mast** has forward *rake*" or "Our **mast** *rakes* aft" becomes "*rake* helps swing the **boom** outboard" (*mast rake* assumed)). Check context. See **Mast Rake**. [WGNT](#)

Reddish Rig: See Common Junk Rigs.

Reef (aka **Furl** aka **Shorten Sail**):

To reduce **standing junk sail** area by lowering one or more **panels** into the **sail bundle**. The procedure in a **junk rigged** vessel is generally as follows: a) release the **halyard**, b) lower desired number of **panels** into the **sail bundle** (**sheets** will slacken as the sail is lowered), c) make **halyard** fast, d) trim sail, and e) if other **control lines** have slackened, trim as necessary. *Reefing* generally takes a matter of seconds from start to finish. Rounding up is generally unnecessary, though when *reefing* while running, eased **sheets** slacken further to let the sail swing forward, and **compression** loads on the **battens** mount; rounding up to some extent may be advisable. [PJR p. 205] See **Reef Upward, Sail Bundle** and **Upward Reef**.

Reef Upward:

To furl one or more **panels** upward, generally by hauling one or more **running lifts**. See **Upward Reef**.

Reefed Bundle: See **Sail Bundle**.

Regular Fan:

A **fanned** region of a **junk sail** whose **spars** radiate from a single point, external to the sail. [PJR p. 24, figs. 2.12-2.20]

Rig (noun):

A **planform** or type with its associated **rigging** and **spars** as is common, designed or implemented. They are often named for a feature (e.g., **Split Junk Rig**), a vessel strongly associated with it (e.g., **Jester Rig**), or the person who developed it (e.g., **Reddish Rig**). See **Planform** and **Sailplan**. [JRA]

Rig (verb):

To implement or install a system. Generally referring to **rigging**, but may be used in other contexts. See **Engineer** and **Jury Rig**. [WGNT](#)

Rigging:

Any item or coherent collection of line or **tackle** incorporated into a **rig**. [WGNT](#)

Rigging:

The aggregate of **rigging systems** or **rigging components** associated with the subject under discussion (e.g., *rigging* of the **junk sail**, the **mast**, the vessel as a whole). [WGNT](#)

Rigging System:

Any assemblage of cordage and hardware (e.g., **blocks**, fairleads, cleats, etc.) into a coherent system (e.g., **sheeting system** or **halyard**). Typically, these systems will position, constrain and control **spars** and/or sails. They may be **rigged standing**, **running** or a combination. See **Control Lines**.

Rigid Batten:

A **batten** engineered for minimal bending. *Rigid battens* have been generally preferred, especially in more traditional **junk rigs**. See alternatives, **Bendy Batten** and **Tuned Batten**. [PJR p. 13, figs. 1.6-1.8]

Rise: See **Batten Rise**.

Ro aka **Ryo:**

Japanese variant of the **yuloh**, distinguished by precise **loom** angles and a longer blade. See **Yuloh**. [Douglas Brooks: *A Different Way to Ro* WBM 192:54]

Roach:

Convex curve in the **leech** of a **fanned** portion of a **junk sail**. In **junk rig**, this may interfere with **aft lead sheets**, and require them to be manually passed around the *roach* when **tacking**. [WGNT](#)

Rope Grommet aka Grommet:

A loop made from a single strand of laid line or twine. It is made by laying the strand around itself to reconstruct the lay, then splicing the ends against and into the lay. Small ones may be used to form **sail grommets** with associated techniques. Larger ones may be used to create an *eye* along any **spar**, post or open rail by draping the flat loop around one or more times, and feeding one bight through the other. One or more thimbles or eyes may be seized into a bight or bights. A **grommet** forms the strop of a **rope stropped block**. [WGNT](#) See **Grommet** and **Rope Stropped Block**.

Rope Stropped Block:

A **block** whose **bail** and **becket** (if present) are attached by means of a seized, **rope grommet**. See **Block** and **Rope Grommet**. [WGNT](#)

Roping: See Bolt Rope.

Round Only Method: See Barrel Method.

Running Back Stay:

A **running stay** leading aft and to one side of the **mast**, typically rigged in pairs. Generally, on each **tack**, the windward **stay** is set up taut to provide support against wind pressure, and the leeward **stay** is eased. *Running back stays* are common on **rigs** such as **junk rig** and gaff rig, in which the **peak** would foul a **stay rigged standing** along the vessel's centerline.

Running (Line or Rigging):

Rigging which is adjustable in the normal course of sailing. *Running* lines are generally **control lines** and are often designated as **hauling** lines. In **junk rig** the fall of a *running* line is generally led to the cockpit. See entries beginning with **Hauling** or **Running**, and alternative, **Standing (Line or Rigging)**. [WGNT](#)

Running Spanline (aka Sheet Hauling Span aka Spanline):

A **control line**, **rigged running**, led through a **euphroe**, and linking **sheet** and **sheet spans** and/or aft **batten** ends. The *running spanline* is adjusted to shape the sail's **leech**, controlling **sail twist** and 'belly'. Position is held by friction holes in the upper **euphroe**. The *running spanline* may require shortening as the sail is **reefed**, generally after each two or three **panels** are **furled**. [PJR pp. 74, figs. 4.51-4.52] See **Euphroe**, **Sheet Span** and **Sheeting System**.

Running Tack Parrel (aka Tack Hauling Parrel (aka Boom Hauling Parrel aka Bowsing Tackle):

A **parrel** toward the **tack**, **rigged running**, and variously along the forward **boom**. It is used to haul the **junk sail** aft, reducing **balance** for on-the-wind sailing. When eased, the sail is allowed to swing forward, increasing **balance** for offwind sailing. [PJR p. 42, fig. 3.24]

Ryo: See Ro.

S (Sling Point):

In some discussions, refers to **Sling point**. Check context. See **Sling Point**.

Sail: See **Planform**.

Sail Bundle aka **Bundle** aka **Reefed Bundle** aka **Furled Bundle**:

The portion of a fully or partially **reefed junk sail** and **spars** which accumulate in **sail gatherer** portions of **lifts**. Ends of **spars** lowered into the *sail bundle* develop **stagger**. See **Lift**, **Sail Gatherer** and **Stagger**.

Sail by the Lee:

A phrase which describes the situation where the wind has crossed the vessel's stern (to the same side as the sail), but the sail has not (yet) **gybed**. When *sailing by the lee*, one is at risk of imminent, **accidental gybe**. The margin of error in *sailing by the lee* is, however, higher among **junk rigged** vessels, especially those with **unstayed masts**. See **Gybe**.

Sail Gatherer (aka **Sail Catcher**):

Extra lines, or a **fabric** pouch, affixed to lower **lifts** for the purpose of gathering **bunts** when furled into the **sail bundle**. [PJR p. 53, fig. 3.53]

Sailcloth:

The **fabric** or film portion of a sail, or its constituent lengths. In a **junk sail**, sailcloths are generally oriented lengthwise, parallel with the **leech**, in line with **tensional** stresses transferred from the **yard**. [W::Sailcloth](#) See **Fabric**.

Sail Grommet aka **Grommet**:

A smallish eye affixed to **sailcloth**, through which a line may be passed. It's purpose is to spread the load imposed by the line, and protect **sailcloth** from chafe. Often, these are made of two metal components, pressed and peened together. *Spur-tooth grommets* have teeth between their components which 'bite' **sailcloth** for enhanced hold. Rarely, a *sail grommet* may be fashioned from a very small **rope grommet** sewn in place. See **Grommet** and **Rope Grommet**.

Sailplan aka **Sail Plan**:

The design for a specific sail, specifying dimensions, location of **spars**, **rigging** and particulars. By convention, the sail is drawn in **profile**. [WGNT](#) See **Planform** and **Rig**.

Sail Twist aka **Twist**:

Greater angle of sail **incidence** (relative to the vessel centerline) aloft than allow. Degree of *sail twist* in fully **battened**, **junk sails** imparts some **camber** to the sail as a whole. These **battens** are controlled along the **leech** by **sheeting systems** (an advantage over western **rigs**, which are not).

Sampan:

Usually a smaller, traditional, eastern water craft, often with a wide, overhanging bow and bow transom, and high stern. Occasionally, indicates a **hullform** reminiscent of those craft, such as a **junk**.

[W::Sampan](#) See **Junk**.

Scallop:

Tendency of the **bunt** of **junk sail panels** to curve to leeward under press of wind, drawing their bounding **spars** slightly toward the **panel's center of pressure**. *Scalloping* is approximately cylindrical in section, when **battens** are parallel, and conic in section, when **battens** are **fanned** (**camber** complicates this simplified account). [PJR p. 16, figs. 1.10-1.11] See **Camber**, **Fan**, **Parallelogram** and **Vortex Theory**.

Scantling:

The dimensional specifications for construction elements (e.g., timbers, frames, planks, etc.), especially **spars**. [WGNT](#) [PJR chapters 8 and 10]

Sea Anchor:

A drag device deployed into the sea from or near the bow, which holds it up to meet seas while stopping all forward progress. Generally, the setting of a *sea anchor* is a heavy weather tactic. Junks were the first known vessels to deploy them. See alternatives, **Drogue**, **Heave To**, **Lie A'Hull** and **Weathercock**.

Seam:

Join between two lengths of **fabric**. In **sailcloth**, seams are generally overlapped and sewn. See **Broadseam** and **Sailcloth**.

Section View aka Sectional View aka End View:

View from forward or aft (as specified); possibly transected by a plane, as one might slice a loaf of bread. See **Plan View**, **Profile View** and **View**. [WGNT](#)

Section-of-Cylinder aka Cylindrical Section:

A curved shape, such as may be cut from the sides of a cylinder, in which all longitudinal lines run parallel. In **junk rig**, **parallelogram panels** are generally *section-of-cylinder*, especially when **flat cut**. Sheet construction materials can assume *cylindrical section* shapes.

Section-of-Cone aka Conic(al) Section:

A curved shape, such as may be cut from the sides of a cone, in which all longitudinal lines run convergent. In **junk rig**, **fanned panels** are generally *section-of-cone*. Sheet construction materials can assume *conical section* shapes.

Segmented Batten: See **Jointed Batten**.**Self Tending (Sail or Rig):**

Any sail which need not be adjusted between tacks, or a **rig** composed of such sails. **Junk sails** are typically *self tending*, and **junk rigged** vessels without **fore sail(s)** generally are, as well. [WGNT](#)

Selvage: See **Selvedge**.**Selvedge aka Selvage**

An edge along a length of fabric which is woven back on itself, leaving no loose ends to fray. [W::Selvedge](#) See **Fabric**.

Shear:

'Scissory' forces acting across the longitudinal run of a body. For example, a pair of scissors (shears) cutting paper are applying *shear forces* to that paper. A body **engineered** to resist *shear* or *shear forces* is said to be acting *in shear*. In **junk rig**, many fasteners and fittings work *in shear*. [W::Shear](#) See **Compression**, **Tension** and **Torque**.

Sheave:

The wheel component of a **block**, rotating about a pin with relatively low friction. Bearings may further

reduce friction. [WGNT](#)

Sheet:

A **running line** which principally controls sail **incidence** relative to the vessel centerline. A *sheet* may be manipulated from one or both ends. It typically tensions a **euphroe** or **sheet span**, but occasionally attaches directly to an aft **batten** end. [PJR Chapter 4] See **Double Sheets, Euphroe, Running Spanline, Sheeting System, Sheets, Single Sheets** and **Sheet Span**.

Sheet Hauling Span: See **Running Spanline**.

Sheet Span (aka **Sheetlet** aka **Bridle**):

Standing part of a **junk rig sheeting system** linking two or more **batten** aft ends to the **sheet** or **running spanline**. *Sheet spans* may be **rigged** for various distributions of force, transferred among the **battens** they connect. [PJR p. 56, figs. 4.3-4.5] See **Sheet, Running Spanline, Sheeting System**.

Sheeted Flat aka **Flat Sheeted**:

When **sheets** are hauled in to their limit, forcing sail as close to the centerline as possible. Standing sails are generally *sheeted flat* when the vessel is to be **weathercocked**.

Sheeting System: See **Sheets**.

Sheetlet: See **Sheet Span**.

Note: American Designer Tom Colvin uses the term *sheetlet* for what PJR refers to as **running span line**.

Sheets (aka **Sheeting System**):

Assembly of **control line(s)** affixed along the **leech** of a **junk sail** at or near **batten** ends, which collectively control sail **incidence** (ease out, haul in), and **sail twist** (to a degree varying with implementation). They further provide downward tension at aft **batten** landings, countering **fan-up** tendencies. They minimally include a **sheet**, generally include one or more **sheet spans**, and may include one or more **euphroes, sheet hauling spans** and various **blocks**. **Single sheets** or **double sheets** may be **rigged** on a given sail. This system of **sheeting** along the **leech** is a distinguishing characteristic of **junk rig**. [PJR Chapter 4] See also **Double sheets, Euphroe, Sheet, Sheet Span, Single Sheet** and **Running Spanline**.

Shelf Method (aka **Shelf Foot Method** aka **Lens Method**):

Method for engineering **camber** in **junk sail panels** by extending from each upper and lower **panel** edge a longitudinal, cambered strip of **fabric** (the 'shelf'), extending from **battens**, with their convex edges toward the **panel's bunt**, to join the corresponding edge of a central **panel**. At each point along their length, they add to the vertical distance measured across the **bunt**, creating commensurate slack. Under press of wind, an **aerofoil** shape results. [CP&SJR] See **Camber**, and alternatives, **Barrel Method, Broadseam Method, Dart Method**, and **Horizontal Hinge Method**.

Short Batten Parrel: See **Batten Parrel**.

Shroud:

Transverse, standing lines led from high on the **mast** to deck level, at near right angles to the vessel's centerline, in support of the **mast**. *Shrouds* limit lateral movement of the mast. [WGNT](#) See alternative, **Stay**.

Single Sheets aka **Aft Lead Sheets**:

Single **sheets** affixed along the **leech** and led to (near) deck level. A *single sheet* is generally, but not always, **rigged** for *first pull from top* (hauling part tensions upper **leech**). See **Sheets**, and alternative, **Double Sheets**.

Sister Block:

A specialized **block**, or linked **blocks**, with a **sheave** at each end. These may be employed where the bights of two lines are to run freely, one along the other (typically in various arrangements of **sheet spans**). They have been found to be unnecessary, so long as any single **blocks** involved have sufficiently wide, smooth **bails**. [PJR p. 59, figs 4.7-4.9] See **Block**.

Sling Point aka S:

The point from which the **yard** attaches (is slung) from the midpoint. Positioning the *sling point* aft of mid-point helps **halyard**, usually at or slightly aft of the **yard's peak up a junk sail**. See **Peak Up** and **Yard**.

Slot Effect:

Aerodynamic effect wherein a sail alters the airflow around its associated, overlapping foresail creating a lifting windshift (increased **upwash**) ahead of the foresail, and increasing airflow velocity along its windward side. This makes the foresail more efficient than it would be on its own. **Junk rig** vessels seldom carry overlapping foresails. The *slot effect* may apply in **junk rig** - disputed where not overlapping - in cases of multiple sails, when a sail is fitted with headsails, or in adaptations of the **junk rig**, such as the **Aerojunk Rig** and **Split Junk Rig**. [W::Slot Effect](#)

Soft Wingsail Rig: See [Common Junk Rigs](#).

Snotter:

A **control line** which **tensions** a **spar**, usually from its forward and/or lower end. See **Sprit**, **Sprit Boom** and **Sprit Sail**, **Boom Hauling Parrel**, **Throat Hauling Parrel**, **Yard Hauling Parrel**. [WGNT](#)

Spanline: See **Running Spanline**.

Spar:

Generic term for **mast**, **yard**, **batten** and **boom** in **Junk Rig**, and similar components of other **rigs**. See **Batten**, **Boom**, **Mast** and **Yard**. [WGNT](#)

Spilling Batten aka Half Wishbone Batten:

A curved **batten**, which spills from tack to tack, convex side leeward. It is affixed to the sail at **luff** and **leech** only, and able to rotate at the attachment points. Under press of wind, **sailcloth** conforms to its curve, assuming an **aerofoil** shape. See **Batten** and **Wishbone Batten**.

Split Junk Rig: See [Common Junk Rigs](#).

Sprit:

A **spar** which cuts across the **bunt** of a sail. It may cut diagonally across a quadrilateral sail, from (near the) **tack to peak** (*sprit* of a **sprit sail**, or from mid-luff to clew (**sprit boom**)) It is never used on a **junk sail**, but may be **rigged** on smaller sails on otherwise **junk rigged** vessels. [WGNT](#) See **Sprit Boom** and **Sprit Sail**.

Sprit Boom:

A **sprit**, **rigged** from mid-**luff** to **clew**. It is *self-vanging*, and generally **tensioned** from its forward end by a **snotter**. It is never used on a **junk sail**, but may be **rigged** on smaller sails on otherwise **junk rigged**

vessels. [WGNT](#) See **Sprit**, **Sprit Boom** and **Sprit Sail**.

Sprit Sail:

A sail spread by a **sprit**, **rigged** diagonally across a quadrilateral sail, from (near the) **tack** to **peak**. The **sprit** is generally **tensioned** from its forward end by a *snotter*. It may be **rigged** as a smaller sail on otherwise **junk rigged** vessels. [WGNT](#) See **Snotter** and **Sprit**.

Stability (Fabric):

Resistance of a **fabric** to **stretch**. *Stability* is always least along the **bias**. See **Fabric**, and alternative, **Stretch**.

Stagger: See **Batten Stagger**.

Stagnation Point:

A point in a flow field where the local velocity of the fluid or gas is zero. *Stagnation points* exist at the surface of objects in the flow field, where the fluid is brought to rest by the object. (Static) Pressure is highest when the velocity is zero and hence pressure is at its maximum value at *stagnation points*. In **junk rig** related discussions, the **stagnation point** is generally raised in reference to **foils**. [W::Stagnation Point](#) [W::Static Pressure](#)

Note: A full definition is outside the scope of the JRG. Please consult references for further information.

Stall:

Separation of airflow from the lee side of the sail, disrupting and greatly reducing **aerodynamic lift**. Stall occurs when the sail's **angle of incidence** to the **apparent wind** increases to a critical degree (when sailing too far off the wind). See alternative **Luff (Sail)**.

Standing (Line or Rigging):

Rigging which is fixed (not adjusted) during normal sailing. Generally, if a line is not specified as **running** or **hauling**, it is assumed to be *standing*, though there are exceptions such as **halyard** and **sheets**. Check Context. [WGNT](#) See entries beginning with **Standing**, and alternative, **Running (Line or Rigging)**.

Standing Lower Luff Parrel:

A **luff parrel**, **rigged standing**, affixed to the forward ends of the **boom** and lowermost **batten**, which constrains forward movement of these **spars**. [PJR p. 42, Fig 3.26]

Standing Luff Parrel:

A **luff parrel**, **rigged standing**, affixed to one or more **spar** ends, generally returning to another along the **luff**. These constrain a **junk sails** position, relative to the **mast**. [PJR p. 44, figs 3.35-3.38] See alternatives **Short Batten Parrel** and **Luff Hauling Parrel**.

Standing Tack Parrel:

A **parrel**, **rigged standing**, starting and ending at the **tack**. It constrains forward movement of the **boom** relative to the **mast**. [PJR p. 42, Fig. 3.25]

Standing Throat Parrel:

A **parrel**, **rigged standing**, affixed to the **throat**, and forward end of an upper **batten**. It constrains forward movement of the **throat**, and helps to peak up the **yard**. [PJR p. 46, fig. 3.39]

Standing Yard Parrel aka Yard Parrel:

A **parrel, rigged standing**, affixed near the **slings point** and forward end of the **yard**. It prevents the **yard** from *blowing away* from the **mast**. In some cases it may be **rigged** around the **halyard** and/or **lifts** to prevent fouling with the **yard** end during a **fan-up**. [PJR p. 55, fig. 3.56]

Stay:

A line led from high on the **mast** to deck level, generally along the vessel's centerline, limiting fore and aft motion. Sails may be set on a *stay*. [WGNT](#)

Stay:

A **stay** or **shroud**, generically speaking. A **mast** rigged with either or both is said to be *stayed*. [WGNT](#) See **Stayed Mast** and **Unstayed Mast**.

Stayed Mast (or Rig):

One or more **Masts** supported by **stays** and/or **shrouds**. These may be strongly or lightly **tensioned**. See alternative, **Unstayed Mast**.

Steerageway:

Sufficient flow of water over the rudder to enable response to the **helm**. Requisite velocities vary by vessel and rudder characteristics. [WGNT](#)

Stretch (Fabric):

The tendency of **fabric** to deform under **tensional** load, greatest along the *bias*. If *stretched fabric* recovers as **tension** eases, it is said to be **elastic**. In **sailcloth**, **inelastic stretch** generally degrades sail performance, and specialized **fabrics** are often used to minimize *stretch*. In **junk sails**, however, *stretch* may contribute to **camber**. See **Fabric** and **Sailcloth**.

Strop:

A short length of line or **rope grommet** used to affix one item of **rigging** to another, or to the vessel. See **Rope Stropped Block**.

Sunbird Rig(s): See Common Junk Rigs.

Tabernacle:

A box-like structure securing a **cantilever mast** at its lower end (generally near deck level). The **mast** is generally hinged around a **pivot bolt**, with **mast heel** secured by a **mast stop**. A *tabernacle* generally facilitates raising and lowering a **mast**. A **mast** is said to be *stepped in a tabernacle*, despite having no **mast step**, in the usual sense. **Unstayed masts** are often stepped in a *tabernacle*, with sufficient **bury** between **pivot bolt** and **mast step**. See **Bury, Mast Step, Pivot Bolt** and **Unstayed Mast**. [WGNT](#)

Tack (noun):

Lower, forward corner of sail. [WGNT](#)

Tack aka Come About (verb):

A sailing manoeuvre in which course is altered, bringing wind across the bow from one forward quarter to

the other. During this manoever, while more or less head to wind, the sail is depowered and **luffs**.. See alternatives, **Gybe** (verb) and **Wear Around**.

Tack Hauling Parrel: See **Running Tack Parrel**.

Tack Parrel: See **Standing Tack Parrel** and **Running Tack Parrel**.

Tackle aka **Block-and-Tackle**:

A **running** combination of line and **block**(s), often comprising all or part of a **rigging system**.
[W:Block and Tackle](#) See **Rigging**.

Tackline:

Short, standing line affixed to the **boom** abaft the **mast** and to a deck eye close to the **mast**. It constrains tensions the fully raised **junk sail** and against the pull of the **halyard**. [PJR p. 45, Fig 3.36]

Tension:

'Stretchy' forces acting longitudinally on a body, to pull it apart or away from an attachment point. A body **engineered** to resist *tension* or *tensional forces* is said to *act in tension*. In **junk rig**, many fasteners, all **control lines** and **sailcloths** act in *tension*. [W:Tension](#) See **Compression, Shear and Torque**.

Thread:

A specialized **yarn**, which is generally of small diameter, twisted and laid (like very small rope). It is used in the manufacture of **fabric** and to **hem** and sew **lengths** together. See **Fabric**.

Thread Count:

A value given to represent the density of a **weave**. For any given method, the higher the count, the more dense the **weave**. Standards for these measures are not yet firmly established. Check context for units and methods involved. See **Weave**.

Throat:: Upper, forward corner of a sail. [WGNT](#)

Throat Hauling Parrel (aka **THP**):

A **parrel, rigged running**, which pulls aft and down on the **throat** of a **junk sail**, controlling its position relative to the **mast**. It helps peak up the **yard** for better sail set. This line has been developed in support of **fanned** and **cambered** sails. [JRA]

Topping Lift aka **Aft Lift** (aka **Lazy Jack**):

Rigging system led from the **masthead** down one side of a **junk sail**, through eyes on the **boom** and back to the **masthead** on the opposite side of the sail. It gathers and supports the **sail bundle**, and may be **rigged standing** or **running**. It may divide into **sail gatherers** in the lower portions. See **Lift, Forward Lift, Mast Lift** and **Sail Gatherer**. [PJR p.50, figs 3.47-3.48]

Torque aka **Wrack**:

'Twisty' forces acting on a body. In **junk rig**, the **masthead crane** *torques* the **mast**. [W:Torque](#) See **Compression, Shear and Tension**.

Transitional Panel:

One or more **panels** of a **junk sail** which transition between a parallel **battened** region (**parallelogram**),

below, and a **fanned** region above. It is, in effect, the lowermost, **fanned panel** of the upper **fanned** region, but generally has more in common with those below than those above, being distinguished by a modest increase in **batten** angles, and possibly a change of height. [JRA]

Triple H: See **Horizontally Hinged Hybrid Rig** and **Horizontal Hinge Method**.

Triple H Rig: See *Common Junk Rigs*.

Tuned Battens aka **Bendy Battens:**

Battens which have been shaped and/or reenforced to flex a certain amount under press of wind. Typically, they are **engineered** to flex the optimum amount, and in the optimum proportions, for a given wind strength, with respect to the amount of sail left standing.

Twist (Sail): See **Sail Twist**.

Twist:: Spiral fouling of **rigging**.

Unstayed Mast aka **Free Standing Mast:**

A **cantilever mast** without **stays** or **shrouds** (see **Stayed Mast**), or the **rig** built around such **masts**. **Junk rigged** vessels frequently have one or more *unstayed mast(s)*. See **Unstayed Rig**.

Unstayed Rig aka **Free Standing Rig:**

Rig in which the principle **mast** is an **unstayed mast**. Absence of **shrouds** allows the **boom** to be let swing fully forward, an advantage in many situations. During a **gybe**, risk of **boom** impact on **shrouds** and associated stress is eliminated, while extra swing range allows a sail to fully de-power. See **Unstayed Mast**.

Upward Reef:

One or more **panels** furled upward, generally by means of running **lifts**. This may be done to reduce sail, increase forward visibility or clear a deck load.

Upwash:

Divergent flow toward a **foil's** convex side. In a sail (vertical **foil**), *upwash* is transverse motion, flowing toward the **lee**. See **Foil** and **Downwash**.

(Van Loan Rig):

Erroneous attribution of **Mallory Rig** to Derek Van Loan, who popularized it in *The Chinese Sailing Rig*. See **Mallory Rig** and *Common Junk Rigs*.

Vang: See **Boom Vang**.

Vector aka **Force Vector:**

Force with magnitude and direction. A *vector* is generally represented diagrammatically by an arrow indicating direction of force, and whose length represents magnitude of force. See **Vector Analysis**.

Vector Analysis:

The analysis of one or more force **vectors** to find their net *product*, generally employing diagrammatic

methods. Any single **vector** may be represented as the *product* of two (or more) **vectors**. Uses include analysis of forces acting on **foils**, the hull, **rigging**, and course. [W::Various Sailing Related Vector Diagrams and Formulas](#)

View:

A conventional direction in which plans are presented. See **Plan View**, **Profile View** and **Section View**. [WGNT](#)

Voluntary Turbulence:

Intentional turbulence introduced into flow across a **foil** by means of elective irregularities. This term arose around certain of Maj. Bunny Smith's efforts, inspired by **vortex theory**, to improve windward performance of **junk sails**. His results are contested. See **Fenix Rig** and **Vortex Theory**.

Vortex:

A turbulent, high pressure whorl of gas or fluid. In standard **hydrodynamic theory**, a *vortex* generated by a **foil** or other shape is deemed to increase **drag**. However, **vortex theory** claims that they may be harnessed in some circumstances to produce **lift**. [W::Vortex](#) See **Voluntary Turbulence** and **Vortex Theory**.

Vortex Theory:

A theory of sail drive. In brief, it proposes that turbulent vortices (see **Vortex**) are created by certain sail-shapes (especially conic sectioned ones, bounded by **spars**... see **Fanned Sails**), which, as they roll along **sailcloth** and/or **spars** produce net **lift**. It is proposed that quasi-triangular, conic section sails (e.g., **Crab Claw** and **panels of fanned sections of junk sails**) develop additional drive under this theory. *Vortex theory* is a contested application of **hydrodynamic** repercussions of chaos theory. [ST&P] See **Voluntary Turbulence** and **Vortex**.

Warp:

Filament, **thread** or **yarn** running longitudinally along the **weave**, and run of woven **fabric**. [W::Warp](#)
See **Fabric** and **Weave**, and alternative, **Weft**.

Water Sail (aka Boom Foot Sail):

Any sail set from and below the **boom**. [WGNT](#)

Weathercock:

To swing in line with the wind (or nearly so), under the influence of aft windage. **Junk sails** *weathercock* quietly without flogging, when allowed, spread and supported by their **battens**. **Junk rigged** vessels can **sheet flat** to *weathercock* the vessel in lieu of **heaving to** as a riding technique, whether at anchor or in heavy weather. Alternatively they can ease **sheets** and *weathercock* the sails while lying **a'hull**. [PJR p. 6] See **Drogue**, **Heave To**, **Lie A'Hull** and **Sea Anchor**.

Wear Around (verb):

A sailing manoeuvre in which course is altered to bring wind from one forward quarter to the other, by falling off, **gybing**, and rounding up again. This manoeuvre is generally used when **tacking** is for some reason unachievable or inadvisable. See alternatives, **Gybe** (verb) and **Tack** (verb).

Weather Helm:

The tendency to round into the wind despite a centered **helm**. See **Lee Helm** and **Balanced Helm**.
[W::Weather Helm](#)

Weave:

The pattern of overlapping **threads** or **filaments** making up woven **fabric**. Different **weaves** have varying properties, especially affecting **elasticity** and strength. Density of weave is usually given as **thread count**.
[W::Weaving](#) See **Bias**, **Fabric**, **Thread Count**, **Warp** and **Weft**.

Weft aka Woof:

Filament, **thread** or **yarn** running transversely across the **weave**, and run of woven **fabric**. [W::Weft](#)
See **Fabric** and **Weave**, and alternative, **Warp**.

Weight (Fabric):

Weight of **fabric** is given in *grams per square meter (GSM)* or *ounces per square yard (Oz)*. However, standards are not universally followed, and 'square units' may be substituted by 'unit of length', increasing *weight* artificially. Check supplier for units. See **Fabric**.

Whipstaff:

Essentially a vertical tiller, but which takes up far less cockpit space. Mechanical linkages are required. HG Hasler installed one aboard *Jester*. [WGNT](#)

Wind up the chuff:

Wind from directly aft. The word *chuff* refers to one's backside.

Windward Efficiency:

A general reference to the ability of a sailing vessel to sail upwind. It may be used in a more or less specific manner, possibly referring to **pointing ability**, velocity made good and/or course made good. Lower windward efficiency relative to other modern rigs has weighed against other merits of the **junk rig**. However, recent innovations in shaped (**cambered**) **panels** and **junk sail** geometries have greatly increased the rig's performance. See **Camber**, **Lift to Drag Ratio** and **Split Junk Rig**.

Wing and Wing (aka Wing and Wong):

Running before the wind with sail eased out on both sides. This set may be assisted by **preventer(s)** or forward **raked mast(s)**. See **Mast Rake** and **Preventer**.

Wing and Wong:: Jocular, **junk rig** synonym for **wing and wing** in multi-masted **junk rigged** vessels. See **Wing and Wing**.

Wing Sail:

A sail in which a framework structure is skinned over to form an **airfoil**. *Wing sails* are sometimes rigid, or sometimes allow their shape and/or area to be manipulated.

Wishbone Batten:

A specialized, symmetrical, two part **batten**. Each half is shaped in **catenary curves**, joined at their ends and affixed to a **junk sail** at **luff** and **leech**. Under press of wind, the sail is free to billow to the limit imposed by their curve, without being *cut* as by a straight **batten**. While *wishbone battens* may be adapted to any **junk sail**, they are specified for **Aerojunk Rig** and **Softwing Junk Rig**.

Wrack aka **Wracking Force**: See **Torque**.

Wrinkle:

Minor deformation of otherwise smooth sailcloth, caused by fiber 'memory'. Unlike **creases**, *wrinkles* tend to relax under press of wind, and are not diagnostic of poor set or cut. [CP&SJR] See alternative, **Crease**.

Yard (aka **Lug**):

Spar affixed along the **head** of a **junk sail**, and from which the sail depends. A **halyard** is affixed to the *yard*, at the **sling point**. See **Halyard**, **Sling Point**, **Throat Hauling Parrel** and **Yard Parrel**. [PJR p. 10, fig. 1.4]

Yard Angle:

The angle at which the **yard** is fixed when the sail is fully raised. Angle is generally measured relative to horizontal, though usage occasionally varies. Various theories have been put forward, advocating across the range from high to low *yard angles*. [PJR p. 30 and p. 97, fig. 6.8]

Yard Downhaul:

A **downhaul** rigged for the **yard** in order to assist lowering in extreme conditions. Generally, it will be be affixed to an upper, aft **batten** end somewhat below the **sling point**, through a **block** at the **yard**, and thence to deck level. [PJR p. 49, Fig. 3.46]

Yard Hauling Parrel (aka **YHP** aka **Snotter**):

A **parrel**, **rigged running**, affixed to and led via the **sling point** to deck level. It is used to position the **yard** relative to the **mast** and constrain fore and aft, pitching motion of the **junk sail**. It is adjusted each time the sail is reefed. [PJR p. 37, fig. 3.19]

Yard Parrel: See **Standing Yard Parrel**.

Yarn:

A continuous length of closely interlocked, natural or synthetic fibers, generally loosely twisted. *Yarns* are used in the manufacture of **fabric** and line. [W:Yarn](#) See **Fabric** and **Thread**.

Yuloh:

An eastern sculling oar. It is characterized by a bent upper **loom**, a large blade, flat on its upper, aft surface and rounded on its lower, forward surface, pivoting on a fulcrum (generally a pin and dimple) and tied by lanyard to the deck from the forward end of the **loom**. The **loom** is worked from side to side. **Loom** curvature and lanyard work to spill the blade in a **falling leaf pattern**. The lanyard further opposes the tendency of the blade to dive, sparing the operator the effort. [STOTY]

Zig-Zag Stitch:

The sewing stitch generally used for the construction of sails. It allows a slight amount of adjustment, which works to smooth transitions across **seams** in **sailcloth**.

Common Junk Rigs

In this section, 'Rig' is used to indicate a general type, planform and rigging inclusive (standard usage).

Within explanations, 'planform' is used where general and various junk rigging may be applied, and 'rig' is used where specialized rigging is required for correct function of the planform. This special usage is adopted, here, for clarity, and does not imply standard usage.

Aerojunk Rig: Rig developed by Paul McKay as a Junk Rig adaptation of the Aerorig. It features a triangular main and 7/9 foresail set on wishbone battens, and single halyard (no yard, however). Slot effect is created between foresail and main, which both set leeward, clear of mast turbulence.

Automatic Rig: Concept developed by HG Hasler and JK McLeod. Any planform rigged for 'hands off' operation of all its functions, from a single position (typically an enclosed cockpit) may be considered fully automatic. Junk Rigs which develop positive, aft stagger and low or zero roach are suitable for automatic rigging with aft lead sheets.

Chinese Gaff Rig: Rig developed by Phil Bolger, which lands tuned battens at the mast (zero balance) using gaff jaws. Sheets are led higher and more spread out than is usual (landing on a mizzen or purpose built spar), and sometimes split into two or three separate sheeting systems, reducing downward pull on the leech. First used on Jim Melcher's *Alert*.

Colvin Rig: Rig used extensively (but not always) by designer Tom Colvin, based on a type used by seagoing junks from the South China Sea. It is a fanned sailplan with considerable roach, and generally employs double sheeting with euphroes, sheet hauling spans and sheetlets (sheetlets and bridles, respectively, in Colvin's terminology). They are typically stayed, and often flying triangular foresails.

Fantail Rig: Planform developed by David Tyler for Annie Hill's *Fantail*. It is a moderate aspect ratio, fanned sail with aggressive fan in the upper sail. The luff is convex to counter-balance forward thrust from the canted battens.

Fenix Rig(s): Experimental planforms developed by Group Captain 'Bunny' Smith and initially rigged on *Fenix*. Its several variations are characterized by steeply fanned geometry. Voluntary turbulence was sometimes introduced. His planforms are reported to show gains in efficiency, but require more than usual line handling for best set. Voluntary turbulence is generally considered to have been detrimental to sail performance.

Hasler/McLeod (aka 'Standard') Rig: Planform developed by HG Hasler and JK McLeod, and detailed in PJR as their "recommended sail form". It is flat cut, consisting of a parallelogram with optimal stagger, topped by fanned upper panels. All battens, boom and yard are a constant length; battens may be switched to cover breakages. It is generally rigged with aft lead sheets, absent euphroe and sheet hauling span. It is generally considered to trade some efficiency for simplicity and excellent handling qualities. [PJR p.30, Fig. 2.25]

Hi-Power Rig: Planform developed by John Christian for Newbridge Boats. It is a high aspect, broad headed sail with a low angle yard. Windward efficiency is generally considered to be poor, and it has not been widely adopted.

Horizontally Hinged Hybrid Rig (aka Triple H Rig): Rig developed by Roger Taylor for MING MING II. It features a Hasler/McCleod planform, with cambered upper panels. It's lower panels feature fabric 'hinges'; alternating open pockets attaching a panel at intervals to the battens. Thus 'hybrid'. Adjacent panels interlock in hinge fashion with the batten in place of the hinge pin. Lengths of individual hinges are varied to produce camber in a manner similar to the shelf method.

Jester Rig: Rig developed and used on *Jester*, by HG Hasler. It is high aspect-ratio, with a low angle yard,

extended at its forward end. Aft lead sheets led to the cockpit employed the Hasler/McLeod concept of a fully 'automatic' rig. See **Automatic Rig**.

Johanna Rig: Rig developed and used on *Johanna* by Arne Kverneland. It is a modified Hasler/McLeod planform with two triangular and a transitional upper panels, with all panels adjusted for equal area and cambered. The total result is greatly improved windward efficiency.

Mallory Rig: Planform developed by Dave Mallory (popularized by Derek Van Loan). It is a parallelogram sail, with two transitional panels, and characterized by very low yard angle.

Reddish Rig: Planform developed by Vincent Reddish, abstracted from his survey of Chinese planforms. It is a low aspect ratio, fanned sail. Mr. Reddish prescribes traditional Chinese construction methods of which includes some camber and roped edges for best results. Generally rigged with tack hauling parrel, to 'square away' before the wind.

Soft Wingsail Rig: Rig developed by David Tyler. It is distinguished by a near triangular, high roach sail, in which the reversed yard (foreward end uppermost) places the throat higher than its vestigial peak. A doubled area of sailcloth, set forward on partial wishbone yard and battens, envelops the mast, halyard and parrels. Reduced turbulence from these rigging components improves the sail's aerofoil and efficiency.

Split Junk Rig: Rig developed by Slieve McGalliard. It is characterized by low yard angle and a large balance of around one third total area. With the exception of the upper sail, panels are split along the mast, allowing the sail to set equally well on either tack. All panels and jiblets are cambered, resulting in high lift/drag ratio and excellent windward efficiency.

Sunbird Rig(s): Planforms developed by Alan Boswell for Sunbird Marine. More recent variations (*Sunbird 90s Rigs*) combine features of fanned Fenix and Reddish rigs. It is relatively high aspect ratio, fanned sail with the high angle yard extended to remain forward of the mast, when reefed. The aft end of the uppermost batten is extended to reduce the sheeting problems associated with roach. Generally rigged with tack hauling parrel, to 'square away' before the wind.

Triple H Rig: See **Horizontally Hinged Hybrid Rig**.

Van Loan Rig: Erroneous attribution of Mallory Rig to Derek Van Loan, who popularized it in his book, *The Chinese Sailing Rig*. See **Mallory Rig**.

Common Acronyms

This section spells out common acronyms one might encounter in discussions related to *junk rig*. Where indicated, term definitions are entered under their full text in *Common Terms* Explanations presented here are partial.

AB: Advanced Barge -- Any flat bottom, slab sided barge in which side curvature in plan matches bottom curvature in profile. Side and bottom are approximately equal, reducing cross-chine flow and associated turbulence/drag.

AKA: Also Known As -- Indicates synonymous terms.

AS: Advanced Sharpie -- Concept developed by Phil Bolger. Any flat bottom, slab sided sharpie in which side curvature in plan matches bottom curvature in profile. Side and bottom are approximately equal, reducing cross-chine flow and associated turbulence/drag.

AR: Aspect Ratio -- Proportion of height:width (height to width). Note that in some fields, this proportion may be reversed. See **Aspect Ratio**.

B: Batten -- Length of batten as measured from one end to the other. Used in PJR for many calculations. See **Batten**.

BR: Bermudan Rig -- The one to 'beat'. See **Bermudan Rig**.

CB aka CoB: Center of Buoyancy -- The averaged locus of all the 'floaty forces' acting upon a hull. See **Center of Buoyancy**.

CE aka COE: Center of Effort -- The geometric center of sail area(s) as seen in profile. See **Center of Effort**.

CG aka COG aka G: Center of Gravity (aka Gravity) -- The averaged locus of the distribution of a vessel's mass. See **Center of Gravity**.

CL: Center Line -- The central line of a body. In a hull, the center line is longitudinal, and seen in plan view.

CLR: Center of Lateral Resistance -- The averaged locus of a hulls underwater, profile silhouette. See **Center of Lateral Resistance**.

CMG: Course Made Good Actual course of a vessel, as distinguished from its heading. Incorporates *set* from all influences.

CP: Center of Pressure aka CoP -- The locus of maximum force developed by a foil. See **Center of Pressure**.

DIY: Do It Yourself -- The movement towards self-sufficiency, empowerment and independence. See **Do It Yourself**.

Dmin: minimum Drift -- The minimum drift required for full and proper function. See **Dmin** and **Drift**.

DWL: Design Water Line -- The water line at which a vessel is designed to float.

FG: Fiber Glass -- Glass formed in filaments and woven or chopped and matted. Term often extended to include composites formed with resin. American term (see British *GRP*).

FU: Fan Up -- Raising of panels by wind (not halyard). See **Fan Up**.

FUP: Fan Up Preventer -- Any system rigged to prevent a fan-up. See **Fan Up Preventer**.

G: Gravity (Center of) -- see *CG*.

GR: Gaff Rig -- See **Gaff Rig'**.

GRP: Glass Reinforced Plastic -- Common boat construction composite material. British term (see American *FG*).

GSM (Grams per Square Meter): Standard rating for fabric weight.

HK (Parrel) or HKP: Hong Kong Parrel -- See **Hong Kong Parrel**.

JR: Junk Rig -- Best rig ever. See **Junk Rig**.

JRA: Junk Rig Association -- Association to promote and develop Junk Rig.

JRG: Junk Rig Glossary -- You are here.

KISS: Keep It Simple, Sailor -- Good advice.

LAP: Length Above Partners -- The distance from a mast's partners to its masthead. See **Length Above Partners**.

LHP: Luff Hauling Parrel -- Line adjusting the luff. See **Luff Hauling Parrel**.

LOA: Length Over All -- A vessel's length as measured from foremost to aftmost components. Many harbors charge proportional to the LOA.

LOD: Length on Deck -- A hull's length as measured from bow to transom.

LR: Lateral Resistance -- A vessel's resistance to thwartships motion through water. See **Lateral Resistance**.

LWL: Load Water Line -- See *DWL*, which term is now more commonly used.

LWL: Length Water Line -- Length of a hull measured at the WL (see *WLL*).

NA: Naval Architect -- A certified marine designer.

NACA: National Advisory Committee for Aeronautics -- See **NACA Aerofoil**.

NL: NewsLetter -- Usually, the **JRA Newsletter**.

ML: Mast Line -- Centerline of mast. See **Mast Line**.

P: Panel -- The height of a JR panel. See **Panel**.

PSI: Pounds per Square Inch -- Common unit for measuring pressure distributed over an area.

PPI: Pounds per Inch of Immersion -- Pounds of lading required to raise a given hulls WL one inch.

PJR: Practical Junk Rig -- Book by HG Hasler and JK McLeod. See *Practical Junk Rig*.

S: Sling point -- The point from which the yard is hung from the halyard. See **Sling Point**.

STD: Speed, Time, Distance: -- $\text{Speed} \times \text{Time} = \text{Distance}$.

SMG: Speed Made Good -- A measure of net speed (velocity) relative to a fixed reference (generally *over the bottom*). Also known as *VMG*.

TF: JRA Technical Fora -- JRA fora designated for technical discussions.

THP: Throat Hauling Parrel -- Line adjusting the throat and topping up the yard. See **Throat Hauling Parrel**.

VMG: Velocity Made Good -- A measure of net velocity (speed) relative to a fixed reference (generally *over the bottom*). Also known as *SMG*.

WL: Water Line -- 1) The idealized line formed by the intersection of a vessel with the surface of flat water. 2) A line painted or graven, indicating the DWL or other lading lines. 3) In boat design, the line formed at the intersection of the hull and horizontal planes at (any) specified height(s).

WLL: Water Line Length -- Length of a hull measured at the WL (see DWL).

YCB: JRA Yacht Club Bar --- JRA member forum designated for socializing.

YHP: Yard Hauling Parrel -- Line adjusting yard position. See **Yard Hauling Parrel**.

NOTE: The following sections are works in progress, and are to be completed.

Common Junk Rig Components

-- Illustrated parts of sail and rigging systems (halyard, sheets, etc.)

Common Vessel Terminology

-- As basic as bow/stern, draft, beam, etc.

Common Sailing Terminology

-- Tack, gybe, close-hauled, ease, etc.

Common Formulas and Ratios

Formulas and ratios do not appear to be fully standardized. Variations in definition and usage appear, depending on source. Collections linked in this section present many formulas in common usage, but don't always agree. Further research is recommended.

Note that ratios may often be inverted.

Mast Maximum Diameter Formulas (masthead diameter is about $D/2$):

Hasler/McCleod's formula [PJR p. 129].

Van Loan's formula [CSR p. 36].

[Arne Kverneland's Article](#) reflecting current thinking on somewhat lighter mast scantlings than found in the sources above.

General Formulas:

[Dan Pfeiffer's Collection:](#)

Broad range of formulas and ratios collected into one place, with explanatory text.

[PDF from Sponberg Yacht Design:](#)

Select, formulas and ratios, presented in tutorial fashion.

[Dudley Dix's Coefficients Collection:](#)

Select Coefficients.

[Ted Brewer's Collection:](#)

Select formulas and ratios with explanation of use.

Common Fiber/Fabric Materials

Sailcloth

Materials

Acrylic:

UV resistant synthetic. Somewhat stretchy. Variable elasticity. Low chafe resistance.

Acrylic Coated Polyester:

Synthetic polyester fabric, coated with acrylic film after weaving. Low Stretch. Low Elasticity. High ultimate chafe resistance. Waterproof.

Cotton:

Natural fiber. Somewhat stretchy. Low elasticity. Low chafe resistance. Vulnerable to UV and mildew without treatment. Hydrophilic.

Nylon

Synthetic. Stretchy in lighter weights. High elasticity. Moderate chafe resistance.

Polyester:

Synthetic. Low stretch (particularly in types produced for sailcloth). Low elasticity. High chafe resistance.

Polypropylene (Tarp):

Synthetic. Initial low stretch (degrades to high stretch and open weave). Low elasticity. Moderate chafe resistance. Initially inexpensive.

Fabric Products Commonly Used as Junk Sailcloth

Sailcloth is sold by length from rolls of various widths. It is rated for a given weight in *GSM* (Grams per Square Meter) or *Oz* (Ounces per square yard). See [Conversion Table](#).

This standard is not always followed, however, and weight is sometimes calculated by length of a particular fabric (rather than by unit squared). When in doubt, confirm the units involved.

The following links are to manufacturers, where possible. No endorsement of any product or supplier is implied.

Coastguard:

Coastguard® is a solution-dyed acrylic marine exterior grade canvas. This fabric is mold and mildew resistant and its proprietary finish gives it excellent water and stain resistance.

Odyssey III:

ODYSSEY III™ is an acrylic coated 100% woven polyester fabric (300 denier) with a clear back coat. It is characterized by excellent strength, durability, tear and abrasion resistance, dimensional stability, & UV and mildew resistance.

Sunbrella:

Sunbrella™ is a soft, breathable, solution-dyed acrylic that is UV, water, and mildew resistant and does not noticeably shrink or stretch. Both sides of this marine fabric are the same, meaning that either side can be exposed to the outside.

Top Gun:

TOP GUN™ is an acrylic-coated 100% woven polyester fabric (600 denier) utilizing a proprietary process to coat both the top and bottom, thus allowing the fabric to be completely reversible. It is characterized by excellent strength, durability, tear and abrasion resistance, dimensional stability, UV and mildew resistance.

Top Notch:

TOP NOTCH™ is a 100% solution dyed polyester fabric (840 denier) with a fluorocarbon finish, resulting in a fabric that is breathable, reversible, water repellent and has a luxurious hand (no film coating).

Tyvek:

TYVEK™ and similar (housewrap) products are composed of a flashspun high-density polyethylene fibers. They are extremely strong and resistant to flogging, but easily cut. Ease of joining with specialized tape has encouraged the use of this material for experimental and even permanent sails. Initially, they are somewhat noisy, but once (pre)wrinkled, they quiet down.

Suppliers

Rochford Supply: Suppliers of many marine fabrics.

Sailrite": Suppliers of sailcloth and sailmaking materials.

DuckworksMagazine: : Sell colored, un-logoed TYVEK™.

Rope

Materials

Natural Fibers

Cotton:

Light duty, inexpensive fiber primarily used for string. It degrades relatively quickly, and is required by law in many places as a fail-safe for shellfish traps.

Jute:

Light duty, inexpensive fiber used primarily for twine.

Hemp:

Relatively strong, though rot prone (requires tarring). Once prized for rigging and anchor lines.

Manila aka Manila Hemp:

Less strong, than hemp, but became generally preferred due to higher rot resistance (avoiding most tarring). Once common for running and standing rigging.

Sisal:

Light duty, inexpensive fiber, primarily used for twine.

Synthetic Fibers / Products

Dacron®:

Dacron® is a registered trade name for polyethylene terephthalate fiber products. Available in many application specific forms (including rope and fabric), it has a soft feel and good traction. Moderate UV resistance. Sinks. Low stretch. See Polyethelyne, below, and [Wikipedia Article](#).

Dyneema®:

Dyneema® is the registered trade name for an Ultra-high Molecular Weight Polyethylene (UHMwPE) family of fibers. Available in many application specific forms (including rope and fabric), it has a soft feel, but extreme strength (claims 15x steel by weight). UV resistance unresearched. Density unresearched. Extremely low stretch. Expensive. Used for stays, cable, sails and rope shackles. See [Wikipedia Article](#).

Kevlar®:

Kevlar® is the registered trade name for a para-aramid family of fibers. Available in many application specific forms (including rope and fabric), it has high strength (claims 5x steel by weight). UV resistance unresearched. Density unresearched. Very low stretch. Expensive. Used primarily to reinforce plastic resins for increased strength and/or rigidity. See [Wikipedia Article](#).

Nylon:

Generally softer rope and twine. Elastic, stretching up to around 20% of its length before breaking. Moderate UV resistance. Sinks. Used for anchor line, snubbers, tie-downs and lashings, and sometimes sheet systems.

Polyethylene:

Generally softer rope. Low stretch, with specialty versions in very low stretch. Moderate UV resistance. Sinks. Used for halyards, lifts, sometimes sheet systems, sometimes stays. (Note: A common proprietary name is Dacron, and polyester is commonly referred to by that name, regardless of manufacture).

PolyDac' (POLYpropylene / DACron®):

A composite rope, composed of a polypropylene core with a braided, polyethylene (Dacron®) sheath. This combination gives good handling properties at reduced cost. Low stretch. May sink or float, depending on manufacture. Used as braided polyethylene.

Polypropylene:

Yarns may be mono-filament (harder lay and slippery, may degrade with sharp, spiky broken filaments) or tape (softer lay, less slippery, degrades to hand-friendly 'fuzz'). Low stretch. Low UV resistance. Floats unless weighted. Inexpensive. Used for standing batten parrels, long shore-ties, tie-downs and wherever inexpensive, semi-disposable line is required.

Construction

See [W:Rope](#), and [W:Rope Construction](#).

Braided Rope (Single, Double, Solid):

Tubular strands braided (similar to weaving) in a circular pattern.

Single Braid often has a largish, hollow center (may be called *hollow braid*), and is light duty, and seldom used on boats.

Double Braid consists of two layers of single braid. It is widely used, aboard, for standing and running rigging, and docklines.

Solid Braid consists of strands which all travel the same direction, clockwise or anticlockwise, and alternate between forming the outside of the rope and the interior of the rope.

Laid aka Twisted Rope:

Laid ropes are built up in three steps. First, fibers are gathered and spun into yarns. A number of these yarns are then formed into strands by twisting. The strands are then twisted together to lay the rope. The twist of the yarn is opposite to that of the strand, and that in turn is opposite to that of the rope. It is this counter-twist, introduced with each successive operation, which holds the final rope together as a stable, unified object.

Rope may be *laid* as *three strand* (most common) or *four strand*, and *right-laid* (most common) or *left-laid*, according to their final twist.

Laid rope is widely used aboard for running lines and anchor lines.

Kernmantle Rope (aka Cored Rope):

Kernmantle ropes consist of braided layer (*sheath*) over a longitudinal run of (possibly twisted) fibers (*core*). The outer sheath gives good handling properties, while the inner core provides much of the strength. Sheath and core may be made of differing material. Primarily used as a lower cost alternative to double braid rope.

Twine:

Light duty, laid cord of small diameter. Widely used, aboard, for stops, whippings, lashings, etc..

Glossary Conventions

Participation and Feedback

The Junk Rig Glossary is a work in progress, and input is very welcome.

The related forum is [HERE](#), if you would like to discuss, offer suggestions, comments, resources or constructive criticism. Or you can contact the editors directly at jrgeditor@gmail.com.

Where possible, please introduce your remarks with a copy of the term in question as entered, comments AND a version more or less as you would like to see it written.

The JRG is the work of volunteers, and thus remains an amateur production. Mistakes and misrepresentations, where present, are made in good faith, and are open to correction. Please be tolerant and kind.

Down the road, we envision associated, linked pages to be developed for many JRG common terms. This will be entirely based on participation by JRA members. If you are interested in this phase, please consider joining the [JRA](#) and the Glossary Team!

Standard vs. non-Standard Terms

The JRA would like to promote the standardization of terms in support of clarity. Where possible, terminology established by Hasler and McLeod in *Practical Junk Rig* is preferred. Where innovators have established a platform and associated rigging, their terminology for innovative features is preferred. Otherwise, standards are induced, insofar as possible, from common usage in other publications and on-line discussion.

- * Non-standard terms refer to standard terms. For example:

Non-Standard Term: See **Standard Term**.

- * In cases of a standard term having a non-standard *aka* (also known as), it will be given in parentheses. For example:

Standard Term (aka Non-Standard Term): Definition.

- * In cases where the difference is merely idiomatic (as with 'gybe' and 'jibe') or where no clear standard has been accepted, an aka will be given without parentheses, indicating no preference. For example:

Standard Term aka Alternative Term: Definition.

Modularity

Where possible, terms are defined using simpler, 'building block' words found elsewhere in the JRG, which are not redefined within the definition under development. Such terms are indicated in boldface (e.g., "...attached to the **yard**." 'Yard' is entered in the JRG, and is not redefined in the present entry).

If a component term whose meaning is not generally understood has not been entered in the JRG, please inform the editors [HERE](#).

Generality

Where possible, entries are generalized, with specifics avoided.

For example, a 'topping lift' has hundreds of possible permutations. Rather than attempt a detailed description of any one of them, focus is on the general characteristics which distinguish topping lifts from other rigging components.

Focus favors function over implementation.

Consistency

Where possible, entries are edited for consistently similar presentation and wording.

The general format is as follows:

Term and AKAs: Succinct definition. Elaboration of Particulars. Special considerations. Junk Rig Considerations, if any. [Source] See **Related Entries**, and alternative(s), **Alternative Approaches**.

For example:

Fanned Sail: A junk sail which is mostly or entirely fanned. It is generally accepted that fanned sails enhance the control of twist induced camber; as canted battens twist, the horizontal sail section assumes an aerofoil shape, whose depth is proportional to amount of twist. A fanned sail generally has some roach which may foul aft lead sheets, and may extend one or more battens from the leech to compensate. Negative stagger, forward, may bring the forward end of the yard aft of the mastline when reefed, and may extend the yard forward of the luff to compensate. See **Camber, Regular Fanned Sail** and **Irregular Fanned Sail**, and alternative **Parallelogram Sail**.

Neutrality

The purpose of the glossary is to inform, rather than persuade or draw conclusions. Entries should strive for neutral, descriptive language. Editorial opinions, conclusions or polemics are to be avoided.

Attributions and References

Attributions are made for quotations taken from published works by permission. Following a definition, author or title initials are entered between square brackets, and an entry is made in *Conventions:Quotation Sources* (e.g., "[PJR]"), and may include page information to sources where appropriate (e.g., "[PJR p.10]").

In general, however, paraphrase of quotations is preferred, which allows modification for integration into the JRG, and avoids copyright issues.

References follow the same format to indicate text which has been paraphrased, generally for the introductory definition provided by the source. An illustrative figure may also be referenced (e.g., "[PJR p.10, fig 1.4]"). Note that the page reference does NOT locate the figure, but rather definitive text. If the source is on-line, a link will be provided (e.g., [W:Junk Rig](#), which links to the Wikipedia article on Junk Rig).

* *Practical Junk Rig* - As the most complete, widely read resource on junk rig to date.

- * [Wikipedia](#) - Updatable, community sourced, encyclopedic.
- * [JRA Publications](#) - Large repository of junk rig information. Please consider membership to obtain full access.
- * *Other On-line Resources* - Vast repository, varying quality.

Users of the JRG are encouraged to participate in the *Wikimedia* communities, writing new articles, expanding and correcting current ones, particularly in regard to junk rig. Please consider supporting them financially.

As a source, *Wikipedia* is less than perfect, in that its entries are subject to amateur error. It is, however, correctable and DIY, unlike most authoritative sources. Please use judgement in assessing its information, correct when possible, and when in doubt, look further.

Any reference cited should be listed in the Sources sub-section.

Sources

See [Attributions and References](#) (below) for conventions and rationales.

CSR: *The Chinese Sailing Rig: Designing and Building Your Own* by Derek Van Loan with Don Haggerty

CP&SJR: [Cambered Panels and the Split Junk Rig](#) by Slieve McGalliard

JRA: Junk Rig Association... usages drawn from various forum discussions.

PJR: *Practical Junk Rig* by HG Hasler and JK McLeod, Tiller/Adlard Coles Nautical, 1996... pages refer to text, figures to illustrations.

ST&P: *Sailing Theory and Practice* by CS Marchaj, Adlard Coles Nautical, 1964

STOTY: [Some Thoughts on the Yuloh](#) by Slieve McGalliard

W: [Wikipedia](#)... Reference links provided to relevant, encyclopedic articles within *Common Term* entries.

WBM: *Wooden Boat Magazine*

WGNT: [Wikipedia Glossary of Nautical Terms](#)

A Note on *Practical Junk Rig*

Practical Junk Rig (PJR) by HG Hasler and JK McLeod is the primary source for the 'standard' usage embodied in the JRG. It has the great advantage of currency, and where possible, its terminology has been adopted.

However, its authors intended it to be part of a wider and on-going exploration of junk rig. In their *Preface*, they write, "We are not experts on the vessels of the China coast, nor in the history of the rig... Our knowledge of the work done by other Western designers [is incomplete]."

Despite its dazzling *tour de force*, PJR embodies inconsistencies and awkward terms.

We suggest that the JRA consider and evaluate other sources for terminology, and/or coin new terms, adopting where improvements in clarity and precision are possible, without undue hesitation on grounds of 'orthodoxy'.

Copyright

Copyrighted materials may not be used without permission.

In particular, all rights to *Practical Junk Rig* are reserved, with no exception for educational purposes. Currently, the publishers are being approached, but *permission has not yet been granted*.

Permitted materials, paraphrase and materials from the public domain (or being contributed to the public domain) are welcome.

Many Wikis, including *Wikipedia*, have put their materials in the public domain (except as otherwise noted), and may be drawn upon freely.

'Editors shall practice due diligence in checking sources for provenance.'

Uses of Italics

Italics indicate one of the following:

- * A direct quotation, in lieu of quotation marks, followed by an attribution in square brackets, e.g. (*Sail enthusiasts all over the world are showing an increasing interest in the Chinese, or 'junk', rig. [PJR p. xi]*).
- * The title of a book or article (e.g., *Practical Junk Rig*).
- * The name of a vessel (e.g., *Jester*).
- * A word being used within its own definition. This should only occur later in the definition, once it has been defined, and further discussion ensues.
- * Occasionally, to designate a word's use as an instance (e.g., "The term *lug* is not in common use.").
- * Occasionally to designate a word's special usage, and possible future inclusion as an entry (e.g., "*Warp* and *weft* indicate orthogonally woven threads.")

Use of italics for emphasis is discouraged within entries (though not in discussion).

Uses of Bold Face

Bold Face indicates one of the following:

- * The term header for JRG entries, starting each entry and ending with a colon [':'] (e.g., "**Definition:** Our best attempt to define a term.>").
- * Any term which has its own entry in the JRG (e.g., "**Mastheel:** The lower end of a **mast**." ... *mast* has its own entry).
- * The initials of a Source (e.g., [PJR]). This source should be entered, with full information, under *Sources*.