Rigs and Rigging

Toronto Brigantine

Types of Rigs

- Sloop
- Ketch
- Yawl
- Gaff Cutter
- Schooner
- Topsail Schooner
- Brig
- Brigantine
- Barque
- Barquentine
- Fully Rigged Ship

Gaff Rig vs Marconi (Bermuda) Rig

Bermuda rigged sail
- Sail only has one halyard
- Less sail area
- Easier to set

Gaff rigged sail
- Sail has a peak and a throat halyard
- Greater sail area for same height
- Requires more people to set

Sloop
- One mast
- Fore and aft rigged
- One head sail
- This is the most commonly seen rig these days

Spray – sailed around the world in 1895 by Joshua Slocum, who wrote “Sailing Alone Around the World”
Cutter
- One mast
- Fore and aft rigged
- More than one headsail, usually with a headrig as well

Schooner
- Two or more masts
- Rigged Fore and Aft
- Forward mast is shorter or equal to after mast(s)
- Can be gaff rigged – Bluenose
- Can be Bermuda rig – Challenge
- Grand Banks Fishing Schooner

Topsail Schooner
- Two or more masts
- Gaff rigged sails on all lower masts, square sails on some masts
- A version with raked masts, called the Baltimore Clipper, was much favoured by privateersmen in the War of 1812 (Pride of Baltimore II)

Ketch
- Two masts
- Fore and aft rigged
- Mizzen mast forward of the rudder post (mizzen provides some drive)
- Aft mast is shorter than the forward mast (compare to Schooner)
**Yawl**

- Two masts
- Fore and Aft rigged
- Mizzen mast aft of the rudder post (mizzen is mostly for steering/balance)
- Aft mast is shorter than the forward mast (compare to Schooner)

  ![Spray – re-rigged as a yawl by Joshua Slocum](http://joshuaslocum.net/books/sailing_alone_around_the_world/index.html)

**Barque**

- Three or more masts
- All masts except aftermost are square rigged

  ![Spray – re-rigged as a yawl by Joshua Slocum](http://radio.weblogs.com/0124811/images/2003/11/10/Picton%20Castle%20rear%20quarter.jpg)

**Barquentine**

- Three or more masts
- Foremast square rigged, other masts fore and aft rigged

  ![Gazela – built in 1901 to transport Portuguese fisherman to the Grandbanks Last fishing voyage was in 1969 Now sails the eastern seaboard as an STV](http://www.hnsa.org/ships/niagara.htm)

**Brig**

- Two masts
- Both square rigged
- US Brig Niagara – War of 1812 (Lake Erie)

  ![US Brig Niagara](http://www.hnsa.org/ships/niagara.htm)
Brigantine

- Two masts
- Fore mast square rigged
- Main mast fore and aft rigged

Irving Johnson

Fully Rigged Ship

- Three or more masts
- All masts square rigged
- A true “ship”

Cutty Sark

Other Rigs

- There are countless variations on these basic rigs which have developed throughout the world.

Other Rigs

- Grand Haven Rig:
  - This one developed in the Great Lakes, it is a 3-masted schooner with the Main removed, and stays’ls set between fore and mizzen. It resembles a large ketch, the spacing provides more space for deck cargo.
Other Rigs

• Jackass Barque:
  – This term could mean many things and was used to refer to rigs that didn’t fit the basic definitions.
  – The Olympic was one such variation, with two square rigged masts followed by two fore and aft masts.

Other Rigs

• Bald-headed:
  – This can refer to Barques and Ships which do not cross Royals as well as Schooners with no topmasts.

Other Rigs

Square vs Fore and Aft Sails

Square
• Perform best sailing downwind
• Requires many crew members
• Designed for ocean crossings, following tradewinds

Fore and Aft
• Better at sailing upwind compared to square sails. Why?
• Requires fewer crew to handle sails
• Best suited to coastal sailing, not ocean crossing
Standing vs. Running Rigging

- **Standing Rigging**
  - lines, wires, or rods which are more or less fixed in permanent position while the boat is under sail
  - What are some examples?
- **Running Rigging**
  - lines or wires that are moved or adjusted while under sail
  - What are some examples?

Tuning the Rig

- All components of the rig are connected!
- For the best performance under sail spars must be sitting in the best position, and stays and shrouds must be at the appropriate tension.
- Start with the lower masts and work up and out towards the topmasts and bowsprit
- Rigging officer should monitor the tune of the rig daily while under sail and adjust when necessary, and major rig tuning should be done several times a summer
Sail Theory – How a sail works

• Downwind:
  - sail merely traps the wind
  - boat is being pushed forward

Sail Theory – How a sail works

• Upwind: Bernoulli’s Principle
  - Windward side = high pressure
  - Leeward side = low pressure
  • Sail is sucked towards the low pressure, pulling the boat forward

Sail Construction

Traditional
• Sail is designed by the sail maker – requires many years of experience and is considered an art form
• Sail dimensions are drawn full scale on the floor of a loft – this is called lofting

Modern
• Sail is designed and modeled on computer to get optimal performance

Who makes TBI’s sails?

Sail Cloth

• Traditional sail cloth was natural fibre – cotton, linen, canvas (hemp)
  - subject to mildew and rot
  - stretches and losses shape
• Modern sail cloth is synthetic fibre
  - racing boats use carbon fibre sails – very expensive
  - Our Brigantines use synthetic sailcloth
Sail Panel

- Sailcloth comes in specified widths
- 23 or 24 inches

Seams and Stitching

- Sails were traditionally sewn by hand
- Panels sewn together using double or triple stitching

Bolt Rope

- Rope sewn around the edge of the sail
  - reinforces the sail
  - prevents it from fraying

Tabling

- Extra strip of sailcloth sewn around the edge of a sail to reinforce where the bolt rope is attached
Grommet

- A ring formed by laying up a single strand of rope three times
- Traditionally used to fasten the upper edge or luff of a sail to its stay

Cringle

- A short piece of rope worked grommet fashion into the bolt rope & containing a metal thimble

Hank

- The small ring, hoop or clasp of metal by which the luff of a jib or staysail is bent on to a stay

Roach

- Curve in the leech or foot of a sail
- Why do the square sails have a roach at the foot?
- Fore and aft sails such as a gaff rigged sail can also have a roach
Tumbler

- Piece of wood bolted between the gaff jaws that rests against the mast
- Tumbler pivots between the jaws allowing the gaff to be raised (and lowered) smoothly up the mast
- Allows the gaff to pivot when the gaff is peaked up

Lacing

- Line used to lash the foot, head or luff of a sail to the boom, gaff or mast
- Line used to lash the foot of the sail to the boom would be called the main foot lacing

Gaskets

- Lines or strips of sail cloth used to secure a sail when furled to a yard or boom

Mitre Seam

- A seam in a sail (often on head sails) that joins panels of cloth that are roughly perpendicular to each other
- On a headsail the reinforced seam runs from the clew to the luff and helps to distribute the load at the clew
Parrel Beads

- Large wooden beads threaded on line used to hold fittings or irons to the mast
- Used to hold gaff jaws close to the mast
- Beads allow the line to easily slide down the mast