Trimming Sail

On the brigantines there are two different kinds of sail, square sails and fore and aft sails. The square sails are trimmed by the braces and the fore and aft sails are trimmed by their sheets. The braces and sheets are used in conjunction to present the sails at the best angle to the wind for optimum performance.

Bracing and Cockbill

Yards can be braced with the sails either furled or unfurled, with the yards in their lowered position, or with the sails fully set. However, the yards cannot simply be braced around without paying any attention to the other running rigging. Because of the geometry of the rig, all of the running rigging for the square sails; buntlines, leechlines, sheets and clewlines will all become more taut on the side being braced forward or up. Likewise, the rigging on the side being braced aft or in will become more slack as the yard is braced. It is, therefore, very important to put enough slack into the square sails’ running rigging before the yards are braced so that damage is not done to the rigging or to the sails as the yards are brought around.

Bracing with Square Sails Furled

When the square sails are in their lowered and furled position, the top two yards, the topgallant and upper topsail, are in their lifts. Because the lifts are fixed, the yardarm being braced forward will be pulled up by its lift, thereby becoming canted with respect to the horizon. The yardarm being braced aft will move downward as its lift becomes more slack. When the yard is tilted with respect to the horizon, this is called cockbill. When all the yards are down in their lifts, it is customary to allow all of the yards to become cockbilled as they are braced around in order to keep a neater appearance. The lower topsail yard, not having lifts, can be kept parallel with the upper topsail yard by adjusting the upper and lower topsail sheets. The course yard has adjustable lifts that would allow it to be...
adjusted for cockbill as it is braced, but in practice, it is allowed to cockbill with the other yards in order to maintain a proper appearance. Cockbill can be removed from the course yard by direct application of its lifts, provided the tacks, sheets, and lower topsail sheets are first taken off their pins.

The sequence of actions and appropriate commands before the yards can be braced are:

1. Take all brace coils off their pins and lay them on the deck in preparation for hauling or slacking.
2. Make sure that all of the lines on the side being braced forward have slack in them before the maneuver begins. This includes, buntlines, leechlines, clewlines and sheets.
3. Make sure the fore course tacks and sheets are free to run.
4. The following command would be used:

   “Brace in (up) the fore yards”.

   “Slack the weather (lee) braces, Haul the lee (weather) braces, Tend the sheets and tacks.”

Instead of “weather” or “lee”, you could substitute the words “port” and “starboard” as appropriate. The hands hauling and slacking braces should look aloft and endeavor to keep the yards “stacked” as they come around. The rigging on the side being braced forward should be monitored. If it becomes too taut, the maneuver should be halted and additional slack put in to avoid damaging the sails or rigging.

**Bracing with Square Sails Set**

The procedure for bracing with sails set is basically the same, but there are some important differences. When the sails are set, the top two yards are in a fully hoisted position, which means that their lifts are slack. The leechs of the individual sails, through their sheets, connect all of the yardarms to each other. Square sails get their optimum performance when they are parallel with the horizon. With
the sails hoisted, the only lifts that act on the
“stack” of sails are the ones on the fore course.
When bracing, the yardarm going forward has a
tendency to cockbill. This is avoided by easing
the lift on the side being braced up and hauling
on the opposite lift (the side being braced in). It
is easiest to take all of the slack out of the new
lee lift as the yards come square to the mast.
Because the yardarms are, in effect, all
connected together, adjusting the lifts on the
course causes the cockbill to be taken out of the
entire stack at the same time.

The sequence and commands are:
1. Make sure there is plenty of slack in the
clewlines, buntlines and leechlines on the side
being braced forward.
2. Have crewmembers standing by on the fore
course sheets and tacks to adjust them as the
yards are braced around.

The commands would be:

“Slack the weather braces, haul the lee braces,
tend the tacks and sheets”

“Ease the weather lift, haul the lee lift” – if
needed.

“That’s well, belay”

With the sails hoisted, the marks on the braces
are operative. Leathers have been put into the
braces to mark both when the yards are square
and when they are braced hard up. The brace
slackers and haulers should ease or haul the
braces until they reach those marks before
belaying. In any kind of a wind, additional
muscle will be needed on the weather course
tack and the lee course sheet to make sure they
are got in properly.

While it is preferable to have all of the braces
manned, in a short handed situation, either
because of a small crew or just the watch on
deck, the braces of the upper three sails can be

The adults who work with our
kids are thoughtful, listen,
hear, understand and explain.
taken off their pins and the entire stack can be brought around by just hauling on the fore course braces. After the course braces are brought to their marks and belayed, the other braces can be adjusted individually.

**Trimming of Square Sails**

In a vessel that is motionless in the water, the apparent wind and the true wind are the same. As the vessel gains speed the apparent wind moves forward. On sailing vessels the sails are trimmed to the apparent wind.

The theoretical highest angle to the apparent wind that you can still set square sails is six points, or approximately 67 degrees. Therefore, the wind angles that these sails can be set on varies from six points on the bow to directly astern. While you can get some aerodynamic lift from the squares, most of the drive comes from the wind acting directly on the back side of the sail.

With the wind directly astern, the optimum angle for the squares is directly square or athwartships. As the wind moves forward the yards are braced up until they are hard on the wind. At any point between hard up and the wind directly astern, the optimum angle to brace the yards is to bisect the angle between the apparent wind and the head of the ship.

To get the best performance from the brigantines, the yards should be braced, even when the square sails are not set. Doing this reduces the amount of windage aloft.

**Cockbill and Fanning**

There are two other concepts that should be taken into account when trimming the square sails; cockbill and fanning.

When the ship heels in response to the wind the yards will cockbill with respect to the horizon. Square sails aerodynamically work best when they are more nearly horizontal with the
horizon. The theory behind this is that the wind travels parallel with the surface of the water. If the yards are not horizontal, the wind will flow up and over the yards at an angle, causing an excessive amount of turbulence and a consequent loss of efficiency. Cockbill can be taken out of the yards by use of the fore lifts. Because the leeches of the sails are all tied together when they are set, adjusting the lifts on the course yard will affect the entire stack. When adjusting the lifts, the lee course sheet and tack must be eased as the leeward yardarm is lifted, while the weather tack and sheet are rounded in.

Fanning is the trimming process in which the weather side of the yards are progressively braced further aft or in as you go up the mast. As you leave the water’s surface, the wind speed increases with altitude due to the lessening effects of friction with the surface of the water. As the true wind increases in speed the relative angle at which that wind strikes the sails draws aft. Fanning is the process of trimming the square sails to take advantage of that fact.

Another reason for fanning the yards is so that the upper square sails will luff before the lowers giving the helmsman and officer of the watch early warning of being caught aback. Indeed, when sailing full and by with the yards fanned, the helmsman would endeavor to keep the fore topgallant sail constantly on the verge of luffing to achieve the best angle when sailing to windward.

In practice, the weather yardarm of each higher yard should be just visible from the deck when standing directly underneath the fore course yard and looking aloft.

**Trimming Fore and Aft Sails**

Unlike the square sails, the fore and aft sails get much of their power from aerodynamic lift, the
same principle that causes an airplane’s wing to provide lift. In practice, this is achieved by trimming the sails so that the wind flows smoothly along both sides of the sail at the same time. If the sail is trimmed in too hard, the wind will not flow on the backside of the sail, destroying lift. If the sail is trimmed too slack, the wind will become turbulent on the backside of the sail, causing it to luff. Because a sail will luff when it is not pulled in hard enough it is easy to recognize and correct.

The other consideration for the trimming of fore and aft sails is their effect on each other and on the squares. A very common error on square riggers is to over trim the fore and aft sails. The headsails should be trimmed so that there is a slot between the sails. When the slot is set up properly it causes the wind to flow stronger along the forward side of the sails, thereby increasing their lift. The headsail trim on some points of sail can also affect the squares. If the sails are trimmed in too hard, they sometimes can create turbulence which causes the square sails to backwind. The sheets should be eased to keep the squares working at their best if this becomes the case.

**Sail Balance**

There are various forces which act on the hull of a ship in the water, but they become centered at a point called the center of lateral resistance. A force acting forward of this point puts pressure on the bow. A force acting abaft this point puts pressure on the stern. Each sail has a geometric center know as the center of effort. All of the sails, when taken together have a combined center of effort. Ordinarily, the combined center of effort of the sails should be just abaft the center of lateral resistance of the hull. When this is achieved, the ship will develop weather helm. This means that if you take your hands off the helm the ship will have a tendency to turn up or to weather. The opposite of this is a condition called lee helm, in which the ship
would have a tendency to fall off or turn to leeward.

It is up to the Captain and/or Mate to make sure that the combination of sails is balanced in such a way as to create a slight weather helm. If the sails are unbalanced, it can be seen that a much greater area of rudder is required to hold the ship on course, which causes excessive drag. Indeed, if the sails become unbalanced enough, the rudder can be overpowered and the ship won’t be able to hold course at all. The proper feel for balancing the sails can only be achieved through practice and experience.
Sail Maneuvers

Under sail, the ship is maneuvered using a combination of the sails and the rudder, in different sequences, according to the type of maneuver desired.

The two basic maneuvers when under sail are tacking and wearing.

Tacking is the process by which the bow of the ship is brought through the eye of the wind thereby bringing the wind from one side of the ship to the other.

Wearing is the process by which the stern of the ship passes through the eye of the wind thereby bringing the wind from one side of the ship to the other.

Tacking with Square Sails Set

The following describes the process for tacking when every sail, including the squares, are set.

When getting ready to come about, the crew should be stationed at each fore and aft sail sheet and each square sail brace. For the braces, most of the crew should be put on the weather or hauling side of the fore course. In addition, crew are also detailed to man the fore course sheets, tacks and clewlines as this sail is doused during the maneuver.

The commands and actions taken are:

“Stand by to Come About”

All gear, as described above, are manned. When everyone is ready, the Mate should so inform the Captain.

The Captain will tell the helmsman:

“Ease Down the Helm” – The helmsman begins the maneuver by turning the helm so that the ship begins to come up into the wind.
The Captain will next say:

“Helm’s Alee” – This is a general announcement to the crew that the maneuver has begun. When this announcement is given the following actions should occur:

1. The mainsail sheet is hauled on to bring the mainsail in as tight as possible.
2. The headsail sheets are eased to reduce the center of effort forward.
3. The main staysail sheet is eased.
4. Crew are standing by on the fore course gear.

Just as or right before the fore course begins to luff the Captain will say:

“Rise Tacks and Sheets” – The fore course is brought up into its gear by use of the clewlines only, no buntlines or leechlines. The sheets and tacks have to released in order for this to happen. The lee clewline is belayed so that there is at least two feet of slack in the clew because it will shorten as the yards are braced around. If the clewline is two blocked it will part or cause other damage as the yard comes around.

If the maneuver is going well, at about this point the squaresails will be aback. As soon as the head of the ship is around far enough to complete the maneuver the Captain will say:

“Let Go and Haul”

1. The former lee braces are slacked and the former weather braces are hauled to bring the yards around.
2. As the yards are being hauled on, the former lee lift is slacked off and the new lee lift is hauled on to reduce cockbill on the new tack. This is easiest if it can be completed before the yards are braced all the way around.
3. The fore and aft sails are tacked by releasing the sheets on the former lee side and hauling on the new lee sheets.
4. The Mainsail sheet is eased to its former position.
5. The Main Staysail sheet is hauled back in to its former position.
6. The topping lifts on the mainsail are adjusted so that the new weather lift is tight and the new lee lift is slack. Failure to adjust the lifts causes the topping lift to create a ridge in the sail, which prevents a smooth airflow over the sail. When the airflow is not smooth, the sail loses much of its lift.
When tacking with square sails furled, the brigantines will behave much like a schooner. The only difference is that the yards should be brought around onto the new tack in order to minimize wind resistance aloft. This is necessary to achieve optimum performance.

The preparatory command is the same as before:

“Stand by to Come About”.

The sheets for the fore and aft sails are manned. The next command (to the helmsman) is:

“Ease Down the Helm”

The maneuver is begun. The Captain announces to the crew:

“Helm’s Alee”

1. The mainsail sheet is hauled to bring the boom amidships.
2. The headsail sheets are eased.
3. The main staysail sheet is eased.

At this point it may be necessary to back the headsail sheets in order to get the head of the ship to pay off onto the new tack. If this is necessary the Captain will call out:

“Back the headsails to Port (Starboard)”

This means to haul the headsail sheets taut on the same side as they were before. This causes wind pressure on the forward side of the sail, causing the bow to turn down onto the new tack. Once the ship is far enough around the Captain will call out:

“Let the Headsails and Staysails Cross Over”

1. All of the staysails and headsails are brought over onto the new tack and belayed.
2. The Mainsail sheet is eased out to its former position.
3. The Main Staysail sheet is hauled in to its former position.
4. The Topping Lifts on the Mainsail are adjusted as above.
5. The braces for the yards are manned and the yards are braced around onto the new tack, paying attention to the fore course sheets and tacks and making sure there is sufficient slack in the square sail rigging to prevent damage as the yards are hauled around. This should be checked before the helm is put down.

**Wearing with Square Sails Set**

Wearing is the opposite of tacking, in that the stern of the ship passes through the *eye* of the wind instead of the bow.

The commands and action for wearing ship are as follows:

*“Stand by to Wear Ship”*

All sheets, tacks and braces are manned. The fore course gear is manned.

*“Clew up the Fore Course”*

The fore course is doused and put *in its gear*, leaving slack in clews, bunts and leeches on the lee side. The sheets and tacks are left free to run.

With a large and well-trained crew, it’s possible to wear ship with the fore course set, but it’s generally easier to clew it up because that frees more hands for the braces.

The Mate will tell the Captain that the crew is ready to wear ship. The Captain will tell the Helmsman:

*“Put up the Helm”*

He will then announce to the crew:

*“Wear Oh!”*
At this command the following actions will be taken:

1. The mainsail boom will be hauled amidships by its sheet. In any kind of wind, this will require a fair number of people.
2. The main staysails boom will be hauled amidships by its sheet.
3. The crew manning the braces will start bringing the yards around, endeavoring to keep the wind hitting the sails at a right angle for as long as possible. Eventually the yards will be brought hard up onto the new tack.
4. As the ship turns downwind, the wind will come around far enough so that the wind is hitting the other side of the fore and aft sails. At this point, the weather sheets on the headsails and staysails are let go and the sails are brought over onto the new tack by hauling on the lee sheets.
5. At this point, the mainsail and main staysail sheets can be eased to their former positions.

“Set the Fore Course”

The fore course is set on the new tack, completing the maneuver.
**Wearing with Fore and Aft Sails**

Basically, the commands and actions are the same as when the square sails are set. The important differences are:

1. The fore course gear does not have to be manned, but the sheets and tacks for the course should be made free to run.
2. The yards can be braced around either during or after the maneuver is completed, depending on the size of the crew.

**Boxhauling**

Boxhauling is a maneuver peculiar to square rigged vessels. It is designed to be used in a situation where there is neither good sea room to tack or wear. The maneuver is essentially a combination of both maneuvers which, if done properly, can bring the ship onto a new tack using as little sea room as possible.
The commands and actions taken are:

“Stand by to Boxhaul”

At this command, the sheets, braces, tacks and fore course gear should be manned in preparation for the maneuver. Crew should also be standing by the main gaff topsail gear.

“Take in the Gaff Topsail”

The gaff topsail is doused to reduce sail area aft.

When all is in preparation, the Mate will tell the Captain that the crew is ready.

The Captain will say to the Helmsman:

“Left (Right) Full Rudder”

The Captain will announce to the crew:

“Helm’s Alee”

The ship will begin to come up into the wind. Just before or as the fore course begins to luff the Captain will call:

“Rise Tacks and Sheets”

The fore course tacks and sheets are let go and the sail is clewed up as in tacking. So far, this maneuver is identical to the beginning of a tack.

“Let Go and Haul!”

The yards are braced around before the ship is pointed directly into the wind. This causes the square sails to back. At this point the ship will stop and will begin to make a sternboard. The rudder is kept hard over until the stern of the vessel comes up into the wind. The ship will again stop at which point the following two commands will be given:

“Shift the Helm”
“Let Go and Haul”

The combination of rudder and square sails will now cause the ship to begin a short wear around to the other tack. When the ship is almost dead downwind the Captain will say:

“Let Go and Haul, Shift the Staysail Sheets”

The yards are braced around once again onto the new tack. The headsails and staysails are set normally and the maneuver is complete. At this point the fore course and gaff topsail can be set if desired by the Captain.
Heaving To

There are times when it is necessary to virtually stop the ship by using the sails alone. For instance, if there is a man overboard situation or other emergency requiring the ship’s inflatable to be put into the water. This maneuver is done by backing the square sails while leaving the other sails set.
The commands and actions to be taken are:

“Stand by to Heave To”

The crew will stand by on the braces and fore course gear.

“Rise Tacks and Sheets”

The fore course is brought up into its gear by use of clews, bunts and leeches.

“Let Go and Haul”

The square sails are backed by hauling on the braces until the yards are brought around onto the other tack. At this point the ship should come to a virtual halt. The helm is then put down. It may also be necessary to adjust or take in other sails to get the ship to stop completely. The crew will be advised.

To get out of being *hove to*, the actions are reversed. The fore yards are brought around onto their original tack, the helm is eased, and the fore course is reset.
Emergency Procedures

Shipboard emergencies are signaled by the rapid ringing of the ship’s bell. If you are below decks, you should report on deck immediately for instructions.

Man Overboard

The following actions should be taken in the event of a man overboard.

1. The person witnessing the person going overboard should immediately shout “Man Overboard” and begin pointing at the person in the water. Under no circumstances should he take his eyes off the person. If he loses sight of the person he should hold his hand out with his palm facing in the general direction of the last sighting. Any other persons who see the person in the water should also begin pointing, but not before the following actions are taken.

2. The man overboard pole and life ring should be deployed immediately.

3. The First Mate will press the Man Overboard Button on the GPS (MOB).

4. Any other items that will float should also be thrown overboard. This includes life rings, PFDs, ice chests or any other objects that will create a debris trail.

5. All crew not engaged in pointing will report to their sail stations or man overboard station.

The ship will be hove to and the inflatable will be deployed to rescue the person in the water.

Fire

Any person finding a fire on board should instantly let the Captain and/or Mate of the watch know before attempting to fight the fire. If you are overcome by the fire or smoke before others are made aware, you will have just made a dangerous situation worse.

The presence of a fire will be announced and the ship’s bell will be rung. If you are below decks,
you should grab the nearest fire extinguisher and report on deck to either the Captain or Mate, who will provide further direction in fighting the fire.

The ships internal fire fighting system will be started and the ships fire-fighting hoses will be deployed by the crew detailed to do so.

**Abandon Ship**

This will be announced by the Captain. He will say

“*Stand by to Abandon Ship***”

The following actions should be taken:
1. All crew and other personnel will muster on deck with their PFDs. PFDs should only be put on after you have reached the weather deck.
2. The ship’s inflatable will be lowered and secured by its painter.
3. The ship’s life rafts will be manually deployed.
4. All personnel will stand by their rafts. No one is to go into the rafts or in any way leave the ship until given the command to do so by the Captain.